Semiconductor supplies hitting vehicle sales

How Supply Chain challenges can be effectively managed through Digital Technology & Solutions for planning

Building a better working world

Table of Contents

Foreword

As the world continues to develop new marvels in automobile technology, consumers demand smart and intelligent vehicles. Vehicle manufacturers have been consistently working hard for the last 10 years to incorporate key features like comfort, convenience and functionality and take it to the next level.

While consumers in the mass vehicle segment have begun to enjoy the much-evolved modern day automobile, COVID -19 hit the automotive industry hard and impacted the sector adversely. As the first visible effects of the pandemic were being noticed, automobile OEMs projected a decrease in production and sales, and they subsequently recalibrated their demand outlook. Vehicle manufacturers' projections were initially correct- the first three months saw nearly near zero off take in automobile sales.

The pandemic was also seen as an opportunity by the manufacturers of high-end TV, mobile phone, entertainment system and laptops to serve ***"forced to stay at home consumers"***. Sectors like IT, consumer and healthcare saw an increased consumer demand. This increase further translated into higher demand of semiconductors. For quite some time, semiconductor companies continued to fulfil the robust demand that arose with the changed world order owing the pandemic.

As the world began to recuperate from the impact of COVID-19, auto OEMs started to witness steady increase. At present, the positive demand of automobiles has started to come back and we see that the semiconductor industry is finding it hard to cater to the increasing demand. Automotive players will have to wisely bring back the ball of the pendulum on their side to get hold of the required demand of semiconductors for their continued survival and growth.

1

What semiconductors mean for the industry

Today, scenario, semiconductors form the DNA of a wide variety of new age gadgets like smartphones, computers, industrial equipments and cars. They are also sought for emerging markets of AI, computing and advanced wireless networks.

Adjacent industries competing for the semiconductor

End Use Category	Demand Share by End use	Total Value ($ Billion)
Communication	33%	136.0
Computer	28.5%	117.3
Consumer	13.3%	54.7
Automotive	12.2%	50.2
Industrial	11.9%	48.9
Government	1.3%	5.2

Source: Semiconductor Industry Association, 2020

2

Semiconductor: key enabler for the modern-day automobile

In the 1950s less than 1% of the total cost of manufacturing a car was comprised of electronics. Today that cost goes up to more than 35% of the total cost of a car, which in all certainty is expected to increase to 50% by the year 2030[1]. Of this, the bulk is comprised of semiconductors.

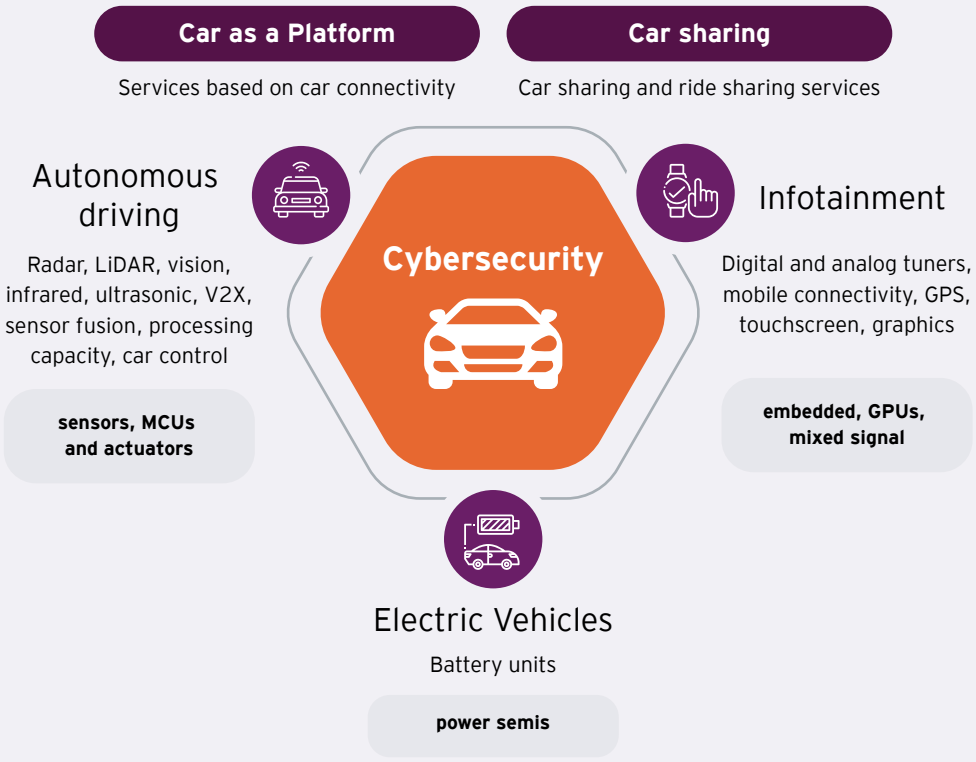
New vehicles which auto manufacturers launch in the market increasingly use advanced technological gadgets, thereby increasing the demand for semiconductors.

In addition to this, the release of hybrid and electric vehicles require a greater proportion of semiconductors for their manufacturing counterparts when compared to traditional internal combustion engine vehicles. Conventional vehicles contain an average of $330 value of semiconductor content while hybrid electric vehicles can contain up to 3,500 semiconductors worth $1,000.[2]

Som Kapoor

Partner, Future of Mobility & Auto Retail Leader, Automotive sector

Semiconductors facilitate decision making and intelligent functioning of modern vehicles. They are integral to the emerging areas of ADAS, infotainment, and ever-evolving emission systems. In fact, they form the backbone of upcoming disruptions in the field of electric vehicles.



[1] https://www.statista.com/statistics/277931/automotive-electronics-cost-as-a-share-of-total-car-cost-worldwide/

[2] https://www.usitc.gov/publications/332/executive_briefings/ebot_amanda_lawrence_john_verwey_the_automotive_semiconductor_market_pdf.pdf

3

What is the semiconductor surge story in 2020?

The COVID -19 pandemic has changed the world order in many ways and has set new normals. The industry ways of the pre-COVID times have been put to test by the current times, and an overhauling has occured in many sectors.

COVID-19 has significantly altered the fundamentals of the sector, including customer behavior, business revenues, and numerous aspects of corporate operations. There is an unprecedented demand for IT technologies such as - servers, connectivity, and cloud usage as online collaboration grows.

COVID-19 has been surprisingly a good demand driver for three distinct industries – IT, mobile and consumer electronics and healthcare. The tables below illustrate this.

IT Hardware (Laptop Server & Storage - Driver's are WFH & Cloud adoption)[3]

Product	2020 growth over 2019
Notebook	26%
Servers (Edge Computing)	20%
Storage	33%

Consumer Electronics

Product	2020 growth over 2019
Gaming Console	30%
TV	13%* (Q3 performance over previous year)

Healthcare[4]

Product	2020 growth over 2019
Ventilators	172%

Mobile phone (India*)

Product	Q32020 growth over Q3 2019
Mobile Phone	8% (50 million units/46.2 million units)

[3] IDC, Nov 2020

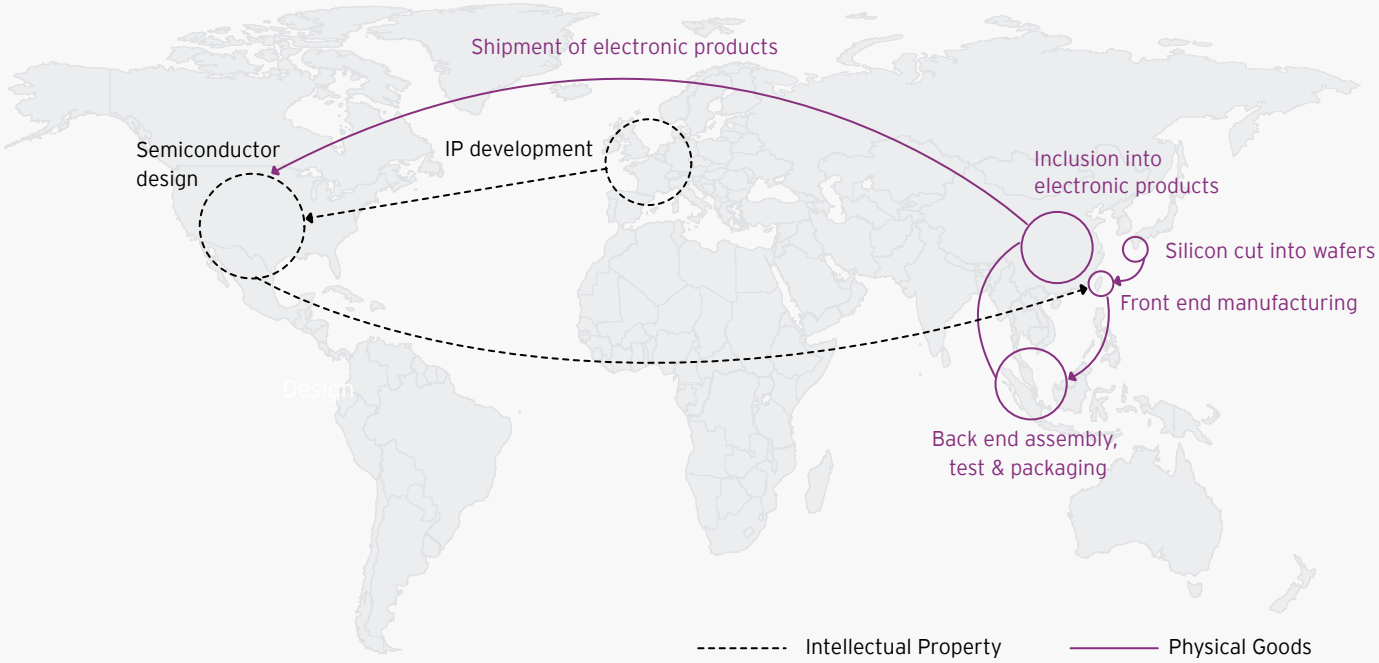
[4] https://www.hospimedica.com/business/articles/294785504/covid-19-acceleration-and-rising-severity-driving-global-ventilator-market.html

* Big focus of Indian government is key contributor for exports

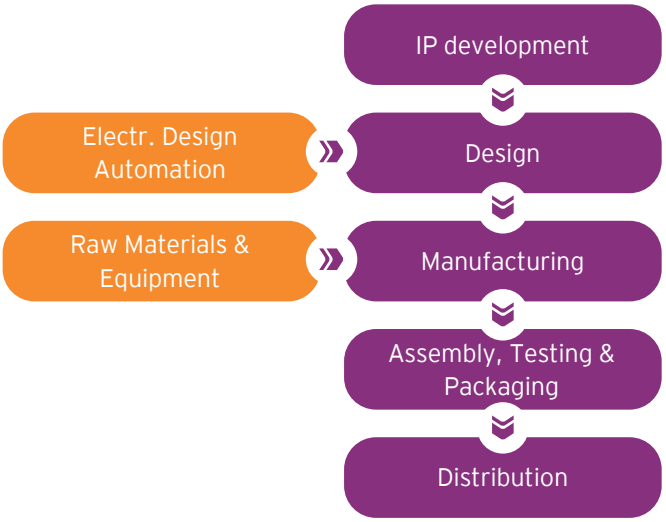
4

View of semiconductor global supply chain

- It is a complex supply chain
- Dependency on few global players



Semiconductor supply chain



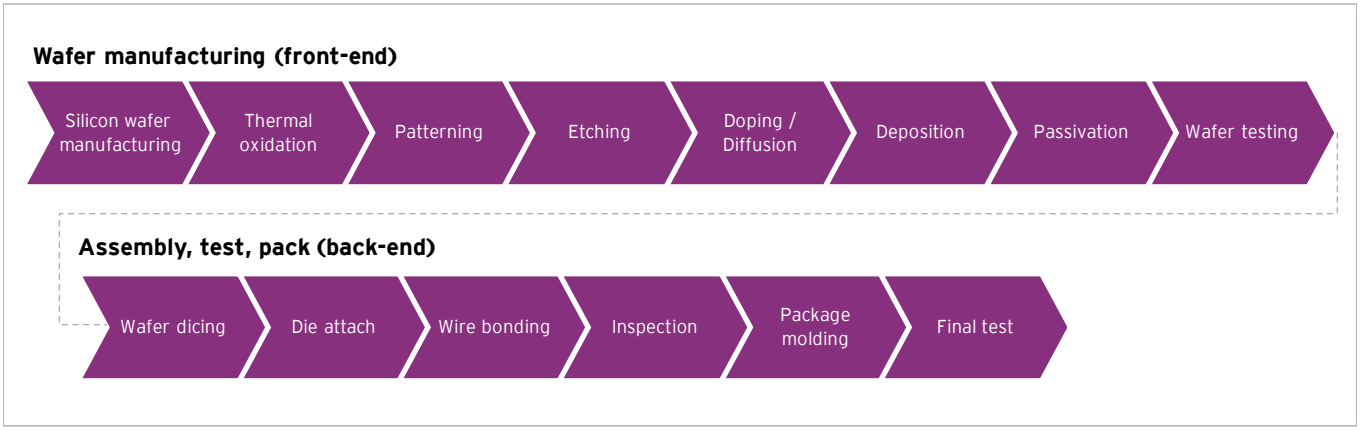
- Design and development of basic chip architecture
- Chip design to fit client needs using proprietary and licensed technologies
- Manufacturing of wafers and chips according to design specifications
- Assembly of chips into appropriate package that provides contact leads
- Shipment to OEM for inclusion in end product

Source: SIA, Beyond Borders, 2016[5]

[5] Beyond Borders, The Global Semiconductor Value Chain

Semiconductor capital equipment value chain

Semiconductor equipment value chain



Source: Source: Semi.org (as per July 2020), Secondary resources

The semiconductor manufacturing process requires very unique, and sometimes scarce raw materials and chemical substances. Due to their unique and specialized character, these tend not to be widely available and can sometimes only be mined in conflict areas. Any disturbance in the supply of these materials has immediate effects on production.

Semiconductor manufacturing is a complex global intertwined ecosystem, which has led to a supply chain that is vulnerable to macroeconomics, geopolitics and natural disasters. Semiconductor companies operate in many different countries and jurisdictions, and each of them have country-specific as well as international laws relating to health and environment regulations.

As the manufacturing process is complex and the ecosystem of players so diverse, there is a flurry of business models with companies targeting scale through market leadership or specialization.

One example is the equipment for lithography, a vital step needed for front-end manufacturing. This is the area where one player commands more than 80% of of market share. Another example is memory chips, which requires steep investments, and which is dominated by a handful of players, who can afford the investments in manufacturing facilities.

Historically, humankind has been tested by the forces of nature innumerable times in the past and COVID-19 is one such occurrence that has gripped mankind today. Having said that, mankind has always shown grit, patience and perseverance to surpass challenges and come out stronger.

The current crisis has left some scars, but with renewed knowledge and foresight, things will once again attain equilibrium in this ever-dynamic world.

The current semiconductor shortage will certainly revive to meet the increasing demands of the present day, provided it is well collaborated with the **latest digital technologies** such as analytics, machine learning, artificial intelligence, among others. This can tremendously help restore the intelligent and smart supply chain. And yet again, the automotive sector will breathe in greener pastures.

5

How EY can Help

How can EY help?

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Supply Chain Planning Solution

1. Supply Chain & Operation practice in EY India has a deep expertise and experience of more than a decade of running large scale Supply Chain transformation projects

2. Team Asterisk is a EY's R&D and delivery organization for supply chain transformation projects.

3. We offer a suite of solution that can help your business build better predictive capabilities, seamless market connect & rapid response capability, thereby, create an aligned, tech-enabled supply chain organization.

4. Team Asterisk has a product lead organization structure with capabilities around the supply chain domain & project delivery, Predictive and prescriptive analytics, Optimization & modelling, AI & machine learning, Software development, housed under the same umbrella.

5. **With solutions development & delivery under one roof. We can help you with:**
   - Delivery of project modules and analytics
   - Development of turn-key technology enabled supply chain planning solutions
   - Rapid-fire diagnostics and dashboards
   - Running the planning cycles on managed services

Solutions consist of a suite of 14 Artificial Intelligence and machine learning enabled integrated planning solutions to build lean and responsive supply chain

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