



Impact of Russian Invasion on Global Chip Shortage

For Prelims: Conductors, Semiconductors, Insulators, use of semiconductors, examples of semiconductors.

For Mains: Reason for the semiconductor crisis, It's impact and possible solutions.

Why in News?

The ongoing [conflict between Russia and Ukraine](#) is worsening the **global chip shortage crisis**.

- Earlier, it was predicted that the **chip shortage would extend until at least 2023**.
- The prediction was **based on the pandemic's effect** on a component that has become a life-line for most gadgets we use every day.
- The global semiconductor market is **projected to grow by 8.8% to USD 601 billion**, driven by a double-digit growth of the sensors and logic category and with the recent **trends in electric mobility, automotive safety, and Internet of Things (IoT)**, the demand for semiconductors is only going to grow.

How did the Shortage Crisis Begin?

- **Lockdowns** increased the growth in sales of laptops to the highest in a decade.
 - Home networking gear, webcams and monitors were snapped up as office work moved out of the office, and laptops were in demand for a while as schools shut.
- The stay-at-home rules also **made several people pick up console-based gaming**.
- These devices in high demand run on **thumbnail-sized semiconductor piece** (or pieces some time), **performing various functions** on a single device and manufacturers produce them as **200mm or 300mm wafers**. These are further split into tiny chips.
 - While the **larger wafers are expensive and mostly used for advanced equipment**, the devices that were in high demand needed smaller diameter wafers.
 - But the manufacturing equipment required to make them were in short supply even before the pandemic began. That's because the industry was moving in the direction of **5G**, which required the expensive wafers.
- **High consumer demand for low-end products, coupled with large orders from tech firms choked chip makers** whose factories were also closed during lockdowns.
 - As the industry gradually tried to pull itself out of the supply crunch, logistical complexities exacerbated the problem.
 - And then the cost of moving containers across the world drove up the price of the core component used in most electronic devices and automobiles.

Why is the Russian Invasion Impacting Chip Shortage?

- Ukraine supplies **rare gases used to produce semiconductor fab lasers**, and Russia exports **rare metals like palladium to make semiconductors**.
 - This **combination is required to build chipsets** that power a range of devices, from

automobiles to smartphones.

- Russia and South Africa are the **two largest producers of palladium**. In 2021, Russia supplied 2.35 million ounces (66 million grams) of palladium.
- The **silvery-white market would move into a severe deficit** without those supplies, pushing the price up.
 - While **platinum and rhodium could be substituted** for palladium, Russia is also a leading producer of the other platinum group metals.
- As [Russia's invasion into Ukraine](#) escalates, the country is getting hit by Western sanctions, which could disrupt the country's exports, leaving the semiconductor firms fewer options to source raw materials to make chip sets.

What is Palladium and what are its Uses?

- Palladium is often used as an **alternative to gold in making various devices** as the metal is **highly malleable and resistant to corrosion**.
- The rare metal is **considered to be softer than gold**, but is still much harder and durable than the yellow metal.
- This quality of palladium **gives it more protection against an impact and a greater resistance** to denting. So, automobile makers, electronics manufacturers and biomedical device producers prefer the silvery-white metal.
- Palladium is used in **nearly all electronic devices**, and the metal is a **key to make chipsets and circuit boards**. It is used to make **Multi-Layer Ceramic Capacitors (MLCCs)**, which are important to make smartphone screens, stereo systems, and power circuit breakers.

How are Businesses and Governments Adapting to these Changes?

- Businesses are reversing their offshoring plans. They are considering **'reshoring' as an option** to be shielded from global supply chain disruptions.
 - Reshoring, also known as onshoring, is the **opposite of offshoring** and involves the **returning of the production and manufacturing of goods** to the company's original country.
- Intel has announced in February, 2022, USD20 billion for two new chip fabrication facilities in the state of Ohio (US). The company plans to invest USD100 billion over the next decade, and build eight more fab factories in the state.
 - Intel is one of the few companies that **both designs and makes its own chipsets**.
- At the other end of the spectrum is government support to provide a conducive environment for businesses to set up facilities to build semiconductor factories.
- The US government is looking to pass the CHIPS Act, a law that would provide semiconductor firms with USD52 billion in subsidies to advance chip making in the country.

What is a Semiconductor Chip?

- It is an **electric circuit with many components** such as transistors and wiring formed on a semiconductor wafer. An electronic device comprising numerous of these components is called **Integrated Circuit (IC)**, and can be found in electronic devices such as computers, smartphones, appliances, gaming hardware and medical equipment.
- These devices find widespread use in almost all industries, especially in the automobile industry.
 - Semiconductors are materials which have a **conductivity between conductors and insulators**. They can be pure elements, silicon or germanium or compounds; gallium, arsenide or cadmium selenide.

What about India's Semiconductor Demand and Related Initiatives?

- India currently **imports all chips and the market** is estimated to touch **USD100 billion by 2025** from USD24 billion now.

- The Union Cabinet has recently **allocated an amount of Rs.76,000 crore** for supporting the development of a 'semiconductors and display manufacturing ecosystem'.
 - It is a belated but welcome acknowledgment of the strategic significance of integrated circuits, or chips, to a modern economy.
- India has also launched the **Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS)** under which a budget outlay of Rs 3,285 crore is spread over a period of eight years for manufacturing of electronics components and semiconductors.

Source: TH

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