The **laptop manufacturing** process consists of several steps including design of a laptop and the end test process. **Computer engineering** depends greatly upon technological and innovative changes. In order to manufacture a laptop, a great amount of energy and resources is required. I will describe a typical **laptop computer** assembly line. The **production lines** are usually divided into two lines: one for laptops and the other for desktops. The production for laptops consists of an assembly line, testing line, repairing line, aging line, packing line, pallet returning line, etc.

Manufacturing

Supply chain for **laptop industry** depends upon effective management and resource allocation. For **supply chain management** purposes there is an overwhelming difference in usefulness between the two types of data. Single-entry data show only the results of what happened with no explanations, there is very little chance that one can learn from the past data in order to promote the recurrence of desirable events or to avoid the recurrence of undesirable events. **Single-entry data** can still be useful, but for those who wish to steer things toward a better state, they are far less useful than **data** that may indicate how the system may be steered toward a better state. **Double-entry data** are intended to satisfy such needs by showing the causal relationship between the event that happened and the reason why it happened. The preliminary step in **laptop production** is **raw materials extraction** and supply of all components. This process can be described as the chemically-intensive manufacturing process which turns pure sand into wafer. Raw materials are produced by heavy extractive industries that mine the metals and silicon.

Metals

Metals are one of the main **raw materials** in all computers, and account for 30 to 50% of a **laptop**. The main parts involve the circuit board, transistors, capacitors, semiconductor and wires hidden inside. The **main types of metals** are copper, lead and mercury used in semiconductors, circuit boards and wiring. It is important to note that lead, arsenic, and cadmium, tailings are highly toxic. Mercury is the main metal used in the newer liquid crystal display (LCD) screens and for solder in motherboards.

Silicon is another important element in all laptops. It is used in computer chips. It is not so toxic as copper and gold, and does not involve acidic slurries or cyanide leaching.

The main component used in chips is silicon dioxide important in a semiconductor chips. Plastic is the material required for a **laptop's outside casing**, for covering internal and external wires, and in circuit boards.

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Production

The first step of **laptop** making is **the production of the printed circuit board**. This is an automated process does not require workers' involvement. Circuits are etched into the board of the laptop computer. After that each component is placed inside the board. This step is automated and only some workers control the production process in order to to avoid defects and breakdown.

Microchips

The core of any **laptop** is the microchip which sits on a microprocessor, named the central processing unit (CPU). It is covered by plastic or ceramic and linked to the circuit board with tiny gold wires connecting it to other elements of the circuit board. The **silicon chip** is very time-consuming and requires hundreds of steps and toxic chemicals and gases (dopants) in order to force it conduct electricity. Each microchip is very small and requires 70 pounds of water to be produced. Another important fact is that 500 to 1,000 chemicals are required to produce the layers of circuitry (phosphoric, sulfuric and nitric acids, gases and solvents (boron, phosphorus and ammonia). The **circuit board** also contains mercury and beryllium (a toxic carcinogen). The latter chemical element is very important because it is useful for electrical connectors because it can withstand high heat.

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