

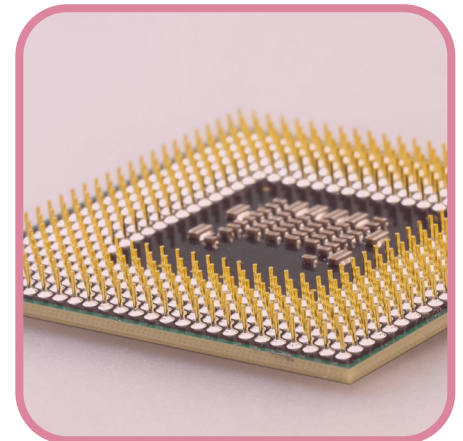
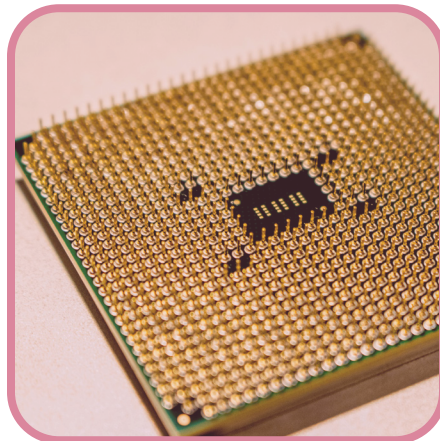
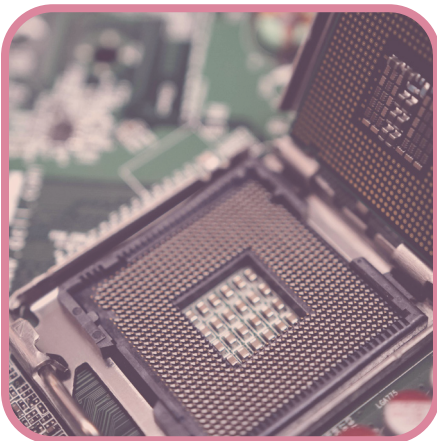
CONCEPT Accuracy, precision and resolution are critical factors in manufacturing that are essential in ensuring products meet the intended specifications and requirements. Accurate and precise measurements enable manufacturers to perform quality control checks, identify areas for improvement, optimize production processes and comply with industry regulations and standards. These factors contribute to better product quality, increased efficiency, reduced costs and improved customer satisfaction.

BACKGROUND

In the late 18th century, the development of interchangeable parts by Eli Whitney revolutionized manufacturing and led to a greater need for precision in production. The Industrial Revolution in the 19th century brought new technologies, such as steam power and mass production, that required accurate and precise measurements to ensure consistent quality.

In the early 20th century, the development of statistical quality control by Walter Shewhart and the later refinement of this technique by W. Edwards Deming led to greater emphasis on precision and accuracy in manufacturing processes. This approach emphasized the need to monitor and control variation in production to achieve consistent quality.

The advent of computer-aided design (CAD) and computer-aided manufacturing (CAM) in the mid-20th century further increased the importance of accuracy, precision and resolution in manufacturing. These technologies allow for greater automation and control of production processes.



Semiconductor Chips

Make sure it measures up

EXAMPLES

MEASURING INSTRUMENTS: Accurate and precise measurements rely on high-quality measuring instruments, such as gauges, micrometers and calipers, that are regularly calibrated and maintained.

QUALITY CONTROL FORMS: Quality control forms, such as checklists and inspection reports, can document measurements and track product quality throughout the manufacturing process.

STANDARD OPERATING PROCEDURES (SOPS): SOPs are detailed instructions that guide workers through the manufacturing process to ensure consistency and quality. SOPs help ensure accuracy, precision and resolution are maintained throughout the production process.

FORMULAS

MEASUREMENT DATA: Temperature readings, dimensional measurements and chemical composition analyses.

QUALITY CONTROL DATA: Quality control data includes information on product defects, rework and scrap rates.

STATISTICAL PROCESS CONTROL (SPC) DATA: Control charts, histograms, and other statistical analyses help manufacturers maintain consistent levels of accuracy, precision and resolution over time.



APPLICATION

Semiconductor chips are complex, miniature devices that require extremely precise and accurate manufacturing processes. The production process involves multiple steps, including photolithography, etching, deposition and polishing, which must be performed with high accuracy and precision to achieve the desired results.

In the photolithography process, a photoresist is applied to the surface of a silicon wafer, and a pattern is created using a mask and light exposure. The pattern is then etched into the silicon wafer, forming the circuitry of the semiconductor chip. The accuracy and precision of this process determines the size and shape of the circuits and components on the chip.

To achieve the required accuracy and precision, manufacturers use advanced equipment, such as high-resolution scanners, to create the masks used in the photolithography process. They also use specialized tools, such as atomic layer deposition and chemical mechanical polishing, to precisely deposit and remove material from the silicon wafer.



powered by:



Nebraska Public Power District
Always there when you need us