

Semiconductor Technology from A to Z

How does it work?

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Packaging & Other Topics

How does 3D chip integration (advanced packaging) work?

Instead of fitting all functions onto one large die, multiple dies or wafers are stacked on top of each other and electrically connected using through-silicon vias (TSVs) or hybrid bonding. This drastically shortens signal paths and allows different technologies (logic, memory) to be combined in one package. HBM memory is the best-known example of this technique.

[Learn more in the chapter 3D Stacking →](#)

How does a MEMS sensor work?

Micro-electromechanical systems combine tiny mechanical structures — membranes, beams, comb electrodes — with electronic readout on a single chip. Physical quantities like acceleration or pressure minutely deform the mechanical structure, which is measured electrically as a change in capacitance or resistance. They're manufactured using adapted semiconductor processes such as surface or bulk micromachining.

[Learn more in the chapter Introduction to MEMS →](#)

How does wire bonding work?

In wire bonding, a thin gold or aluminum wire connects the chip's contact pads to the package leads. A combination of pressure, ultrasonic energy, and sometimes heat welds the wire to the pad without melting it. It remains the most widely used method for electrical interconnection in chip assembly today.

[Learn more in the chapter Bonding →](#)

Why do chips keep getting smaller (Moore's Law explained briefly)?

In 1965, Gordon Moore observed that the number of transistors on a chip roughly doubles every two years — driven by ever-finer lithography and denser devices like FinFETs. Smaller transistors switch faster, use less energy per switching event, and lower the cost per function. In recent years this scaling has been slowing down, which is why advanced packaging and chiplets are gaining importance as a complementary path.

[Learn more in the chapter Applications & Outlook →](#)