Accelerate Time to Market with an End-to-End Systems Foundry for the AI Era

Intel Foundry delivers a full breadth of solutions with manufacturing expertise, advanced packaging technologies, diverse software and services, and a robust partner ecosystem, all built with a resilient, sustainable global supply chain.

Intel Foundry is a full-stack systems foundry that offers an unmatched combination of leading-edge silicon process and packaging technology, a world-class intellectual property (IP) portfolio, and silicon design support. Our full range of advanced technologies and services can help you seamlessly design, manufacture, assemble, and test cutting-edge solutions for the AI era.

We’ll meet you wherever you are in your project journey. With our end-to-end services, you can go from initial specifications and designs all the way to assembled packages, built at global scale, with a resilient, sustainable supply chain. Alternatively, you can make use of our open ecosystem alliance partnerships and bring your own IP, electronic design automation (EDA), and designs to collaborate with us in a seamless workflow that meets your unique requirements. You can even bring us your completed dies and make use of our advanced packaging and testing capabilities—the choice is yours.

Figure 1. As the world’s first systems foundry for the AI era, Intel Foundry offers advanced nodes, a resilient supply chain, and the technical expertise to deliver systems of chips produced at scale and with optimal yields.
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New levels of efficiency from Intel advanced nodes

In this new era of AI-driven computing, devices require immense and growing levels of power, delivered as quickly and efficiently as possible. Traditional chip and packaging designs struggle to keep up with this growing demand.

Intel Foundry delivers world-class silicon process technology with reliability and affordability, all on an aggressive timeline. Our fabrication plants (“fabs”) are on track to advance five nodes in four years (5N4Y), with each generation offering new levels of efficiency to meet increasing demands for greater performance with a smaller footprint (see Figure 2).

To accomplish these goals, Intel pushes the boundaries of advanced technologies. For example, Intel Foundry will be the first to market with RibbonFET gate all-around transistors and PowerVia interconnects. RibbonFET offers significantly higher density and performance compared to FinFET, with exceptional performance-per-watt efficiencies. PowerVia improves utilization and performance with greatly reduced voltage reduction (“IR drop”) by enabling the world’s first silicon backside power solution. With increasingly demanding workloads such as AI requiring smaller, denser, and more powerful transistors, backside power delivery can enable performance and efficiency gains without sacrificing resources.

Combined, these technologies help support the higher density and efficiency requirements needed to continue scaling chip design in the AI era and to maintain the pace of innovation required to sustain Moore’s Law.

Advanced packaging to support “systems of chips”

The demand for AI solutions extends beyond what can be achieved with silicon advancements. Intel Foundry is poised to help you move past the traditional system-on-chip (SoC) integrated circuit design to an efficient “systems of chips” approach, with high-yield and cost-efficient production. We use highly advanced packaging technologies to combine multiple “systems” or chiplets and even multiple process nodes onto a single package.
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Intel Foundry Advanced System Assembly & Test (Intel Foundry ASAT) addresses complex packaging challenges with new design options that drive performance, efficiency, and cost savings into the chiplet ecosystem. Chiplets are then connected using the efficient Universal Chiplet Interconnect Express (UCIe™) die-to-die standard. Intel developed UCIe as a high-bandwidth, low-latency connector that enables an open chiplet ecosystem and ubiquitous interconnect at the package level.

Intel Foundry advanced packaging technologies include:

**Intel Foundry Flip Chip Ball Grid Array (FCBGA) 2D and 2D+** for single-die or multi-chip packages use advanced thermal compression bonding (TCB) tools to enable improved yields and reduced warpage. FCBGA 2D+ extends FCBGA to enable substrate stacking for a lower cost solution.

**Embedded Multi-die Interconnect Bridge (EMIB) 2.5D and 3.5D** offer efficient, cost-effective ways to connect multiple complex logic/logic and logic/high-bandwidth memory (HBM) die. EMIB 3.5D integrates EMIB and efficient, high-performing Foveros 3D packaging technology in a single package.

**Foveros 2.5D and 3D** are the industry’s first 3D stacking solutions and are optimized for cost/performance. Foveros is ideal for solutions with multiple top die chiplets.

**Foveros Direct 3D** extends the benefits of 3D stacking with copper-to-copper bonding and high-density/low-resistance die-to-die interconnects for superior power-per-bit performance.

Intel Foundry ASAT brings leading-edge technology to packaging design for the AI era. Intel also supports Outsourced Semiconductor Assembly and Test (OSAT) partners as part of our commitment to open-system offerings and complete freedom to meet your needs on your terms.

Software and services to empower developers

Intel Foundry helps you accelerate time to market with unified software development across multiple architectures. For example, developers can use oneAPI, a standards-based, multiarchitecture programming model that provides cross-vendor compatibility. With oneAPI, developers benefit from a “write once, run anywhere” approach that helps optimize application performance for greater productivity and innovation.

Intel Foundry provides a systems foundry for the AI era, with end-to-end services all in one place.

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<thead>
<tr>
<th>Technological prowess</th>
<th>A resilient and sustainable supply chain</th>
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<tr>
<td>• World-class wafer foundry</td>
<td>• 99 percent of our global power usage is generated from renewable electricity¹</td>
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<tr>
<td>• Advanced packaging</td>
<td>• Robust and geodiverse pipeline of components</td>
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<td>• Systems of chips</td>
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<th>Simplified engagement</th>
<th>Expertise and support</th>
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<td>• We meet you where you are at any point in the process, from design to fab to packaging</td>
<td>• Customer-first design and support structure</td>
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<tr>
<td>• Use the tools you already know from a vast ecosystem of partners</td>
<td>• 50+ years of engineering experience, advancing Moore’s Law into the future</td>
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Open design ecosystem

By engaging with Intel, you benefit from a total platform advantage with unprecedented access to a wide range of Intel optimizations and libraries. But that doesn’t mean you’re locked into one architecture: we can fabricate any ecosystem core or accelerator, and our expert design and engineering services can help you choose the right solution for your specific workloads.

Intel Foundry also supports a broad, open ecosystem of EDA partners, IP providers, and design services. These alliances simplify your engagement so you can work with the same interfaces and tools you’re already familiar with. In fact, the industry’s leading EDA tools are optimized for Intel Foundry processes and are available with all Intel Foundry nodes. Partners participating in the Intel Foundry Accelerator EDA Alliance get early access to Intel’s process technologies, allowing these partners to co-optimize tools and flows to best realize Intel technologies’ capabilities. This helps customers achieve their performance, power, and area (PPA) goals and accelerate their time to market.

In addition, Intel Foundry Accelerator EDA suites support a full spectrum of design activities, including Design Technology Co-Optimization (DTCO), System Technology Co-Optimization (STCO), design, simulation, library characterization, and signoff. The EDA Alliance covers all aspects of designing modern systems on chips (SoCs), chiplets, tiles, and packages, and it even includes integrating those components using advanced assembly technologies.

Resilient and sustainable supply chain

Intel provides a diverse and sustainable supply chain that helps keep production on track. Intel Foundry draws on a globally resilient, sustainable supply chain for advanced wafers, assembly, and test that spans all regions around the globe. Intel Foundry’s factory network is the only global source of geographically diverse advanced technology at scale in the industry and the most sustainable with 99 percent of its power globally coming from renewable electricity.

Start your journey with Intel Foundry

Our systems foundry approach goes above and beyond what traditional foundries offer. Intel Foundry enables STCO (Figure 3), which gives you the freedom to mix Intel solutions with other ecosystems to create composable, security-enabled solutions that best meet your needs.

Differentiation in action

Figure 3. Intel Foundry demonstrates STCO using advanced packaging to deliver systems of chips on advanced process technologies.
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At every step in the process, Intel Foundry protects your IP. We provide your business with dedicated capacity that is completely firewalled from our other clients, including Intel product teams.

As stewards of Moore’s Law, we persistently innovate and foster collaboration within an extensive partner ecosystem to advance technologies and enable our customers to design leadership products. Our strategic investments in geographically diverse manufacturing capacities bolster the resilience of the semiconductor supply chain, particularly for advanced products.

Your business needs to move fast to stay ahead of the competition in the evolving age of AI and customized, optimized semiconductors. Intel Foundry is uniquely positioned to help you meet your needs with comprehensive services and technology, using open tools and services you’re already familiar with, all from a company you know and trust.

To learn more about Intel Foundry, visit intel.com/foundry.

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1 Intel's 2023–2024 Corporate Responsibility Report (CSR). https://csrreportbuilder.intel.com/pdfbuilder/pdfs/CSR-2023-24-Full-Report.pdf. Intel's CSR is intended to provide a comprehensive summary of our approach to corporate responsibility and our performance for calendar and fiscal 2023, unless otherwise stated. Details regarding Intel’s energy conservation commitments and progress can be found beginning on page 73.

No product or component can be absolutely secure.

Your costs and results may vary.

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