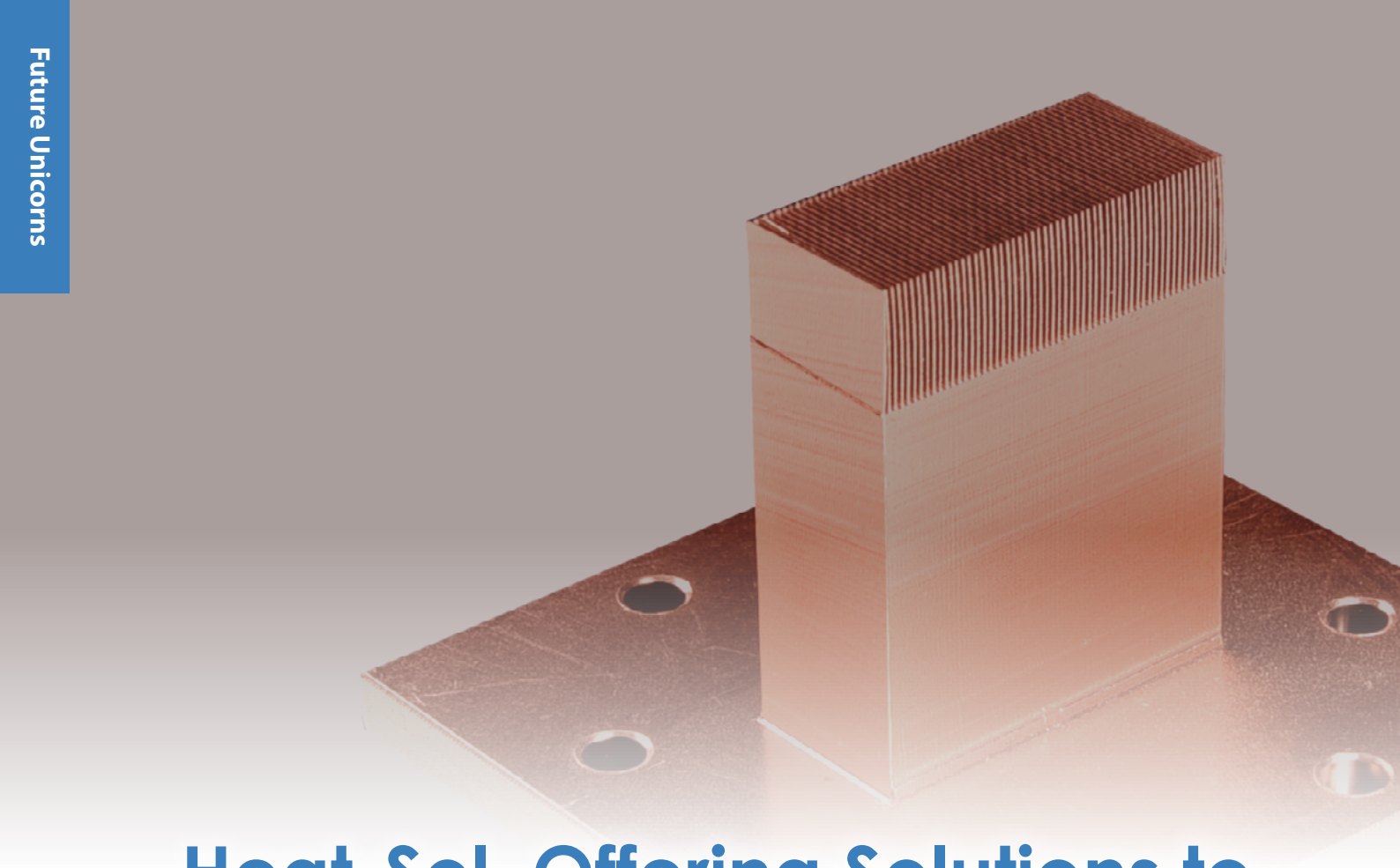


Heat-Sol, Offering Solutions to AI Data Center Cooling

About the Company

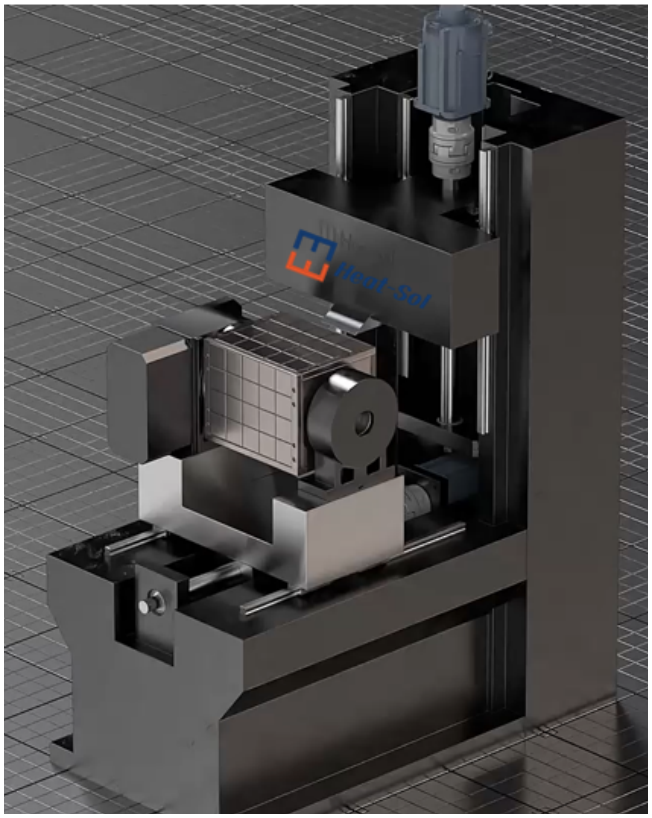
Heat-Sol is a research and development company specializing in skiving (cutting materials in thin layers or pieces) technology. Skiving technology involves cutting materials with high thermal conductivity, such as aluminum or copper, in slices to maximize surface area. Heat-Sol is the only South Korean company specializing in the fundamental skiving technology. Notably, Heat-Sol has independently developed equipment and successfully processed ultra-fine fins as thin as 40μm, which is a world-leading technological feat. Founded in 2020, Heat-Sol began with fundamental research into skiving technology, successfully localized the process, and now holds multiple patented technologies. The company is actively seeking opportunities in the global cooling market, including AI data centers.

Background

Conventional heat sinks primarily relied on processing methods such as aluminum extrusion, press-fitting, and casting. However, the skiving process offers high thermal conductivity compared to existing methods, resulting in superior heat dissipation efficiency. This is because skiving enables the processing of thinner fins and tighter spacing within the same volume, maximizing the surface area a heat sink can possess. Particularly as demand for higher heat dissipation efficiency has recently shifted from air cooling to liquid cooling and from aluminum to copper—a material with higher thermal conductivity—Heat-Sol is confident that skiving technology could be recognized as a processing technique far excelling other methods.

About the Product

Heat-Sol has successfully localized skiving technology and is currently developing a fully automated CNC skiving machine as a TIPS R&D project. The prototype built by Heat-Sol can successfully process ultra-fine fins as thin as 40μm. This represents the world's highest standard, surpassing the previous limit of 150μm achievable with existing equipment. Skiving is similar to the woodworking process where a surface is shaved off by pushing wood against a plane. It involves thinly shaving the surface of a metal base material using a knife attached to the arm of a processing machine. The resulting thin metal fins, resembling shavings, are then pushed to stand vertically on the base material's surface. Unlike milling methods that remove material from the base, this knife-cutting approach reduces material waste by more than half. Since the fin and base are formed from a single material, there is no contact thermal resistance. However, secondary finishing is essential, as sharp burrs form at the fin tips during processing. Under identical conditions, the heat dissipation performance of a skived heat sink is 1.5 to 2 times greater than that of conventional bonded (press-fit) fins or soldered heat sinks, making skiving an ideal method for improving the performance and lifespan of heat-generating components. Additionally, it was confirmed that skiving improves heat dissipation performance by 10 to 13 percent compared to the press-fit method. Furthermore, skiving allows the processing of various shapes, and Heat-Sol completed the application of numerous patent and design registrations, including the development of V-fin shapes suitable for air cooling (2021), Y-fin shapes suitable for natural cooling (2021), and seaweed fin and wave fin shapes suitable for water cooling.



Competitive Edge and Business Strategy

Heat-Sol is developing skiving technology at its corporate research institute, led by its CEO and two other executives with over 20 years of experience developing inverters and power stacks in the power semiconductor industry, along with a principal researcher—a specialist who is the youngest to have simultaneously earned Korea's Master Machinist title and Master Electronics Technician certification—and two other staff members.

Heat-Sol's core competitiveness lies in its expertise as a skiving specialist, encompassing materials, processing technology, and equipment for skiving and possessing world-class technological capabilities.

Heat-Sol has completed R&D for entry into the following three major target markets:

- Completed development of ultra-fine fin shapes effective for AI data center liquid cooling (D2C) and immersion cooling
- Developed cooling channel forming technology for SiC used in EV inverters
- Completed development of heat-dissipating busbars with heat dissipation functions for use in circuit breakers

Based on these achievements, Heat-Sol is working to enter overseas markets in Japan, the US, and Europe through participation in exhibitions, among other activi-

ties. The company is also working on a joint venture (JV) for factory construction in Uzbekistan.

Future Plans

For the AI data center cooling market, Heat-Sol is developing products with LG Electronics in Korea. For heat sinks for EV inverters, the company is working with LG Magna, Hyundai Motor Company and others. For heat sink busbars for circuit breakers, the company has partnered with LS Electric and is introducing them to the global market.

Plans for Entering Major Markets:
- Application of heat sink in EV inverters (KRW 2.5 trillion market): Proof of Concept (POC) underway with five domestic and international companies; initial mass production expected in 2026.
- Application for low-voltage circuit breakers (KRW 600 billion market): POC underway with a leading domestic company, global marketing in progress (with KOTRA).
- Application for heat sinks in AI data centers (KRW 1.4 trillion market): POC underway with a leading domestic company to develop and evaluate proprietary fin shapes.

Research and Development:
- R&D Plan: Simultaneous development of proprietary technology-intensive equipment (TIPS R&D) and exclusive standardized components for market entry
- 2025: Advanced design and prototype production/evaluation of heat dissipation busbars (With ITP support, Korea Electrotechnology Research Institute)
- 2025: Development of components for immersion cooling in AI data centers
- 2026: Planned development of AI data center cooling systems (AGAMI PJT; Scale up TIPS R&D)
- Development of value-added components—Integration of heat dissipation plate components and ceramic plates

Business Plans:
- Overseas Marketing to establish a foundation for entering markets in North America, Japan, and Europe with KOTRA
- Joint venter for building an overseas factory in Uzbekistan
- Attracting investment funds to expand production in Korea

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** The opinions expressed in this article are the author's own and do not reflect the views of KOTRA.*