

SynthCool Product Brochure

SynthCool Landau™

Two-Phase Liquid Cooling Solutions

- Two-Phase Cold Plate
- Two-Phase Immersion cooling
- Intelligent Control

Overview of SynthCool Landau™ Two-Phase Liquid Cooling Technology

The Landau™ series is a comprehensive Two-Phase liquid cooling solution developed by SynthCool, comprising two major product lines: two-phase immersion cooling (2PIC) and two-phase cold plate cooling (2PCP). Leveraging highly efficient two-phase boiling heat transfer and an electrically insulating dielectric refrigerant that is safe for electronic components, Landau™ enables full-stack, water-free cooling from the chip level to the data center level.

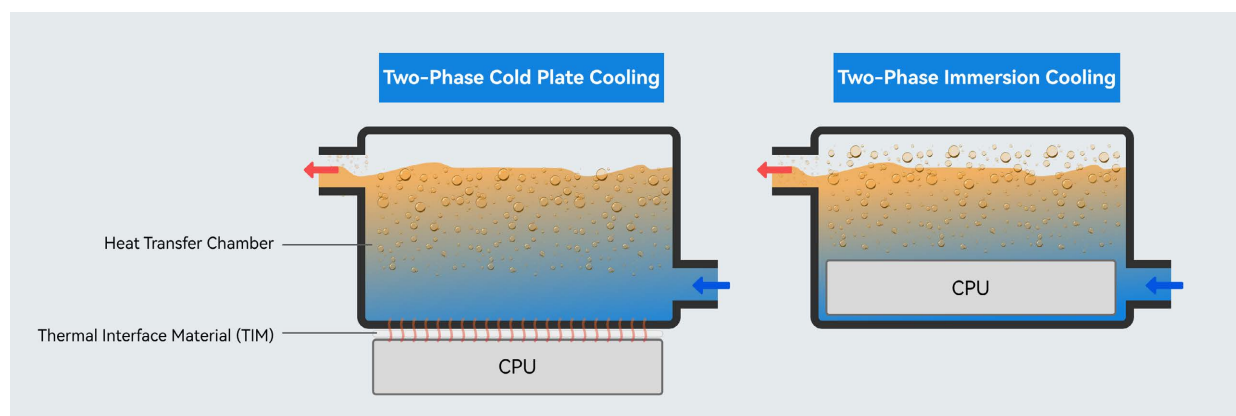
The Landau™ Series supports 3000W+ cooling capacity per chip and rack power densities above 200kW, meeting the extreme thermal demands of current and next-generation high-performance CPUs and GPUs. It provides a reliable, energy-efficient, and future-ready thermal management foundation for AI data centers, supercomputing centers, and other high-heat-density applications.



Landau™ Two-Phase Cooling Product Portfolio

Why is Two-Phase liquid cooling better suited for high-power chips?

Compared with single-phase cooling, Two-Phase cooling utilizes latent heat transfer, enabling significantly higher heat absorption at lower flow rates and reducing pumping power consumption.

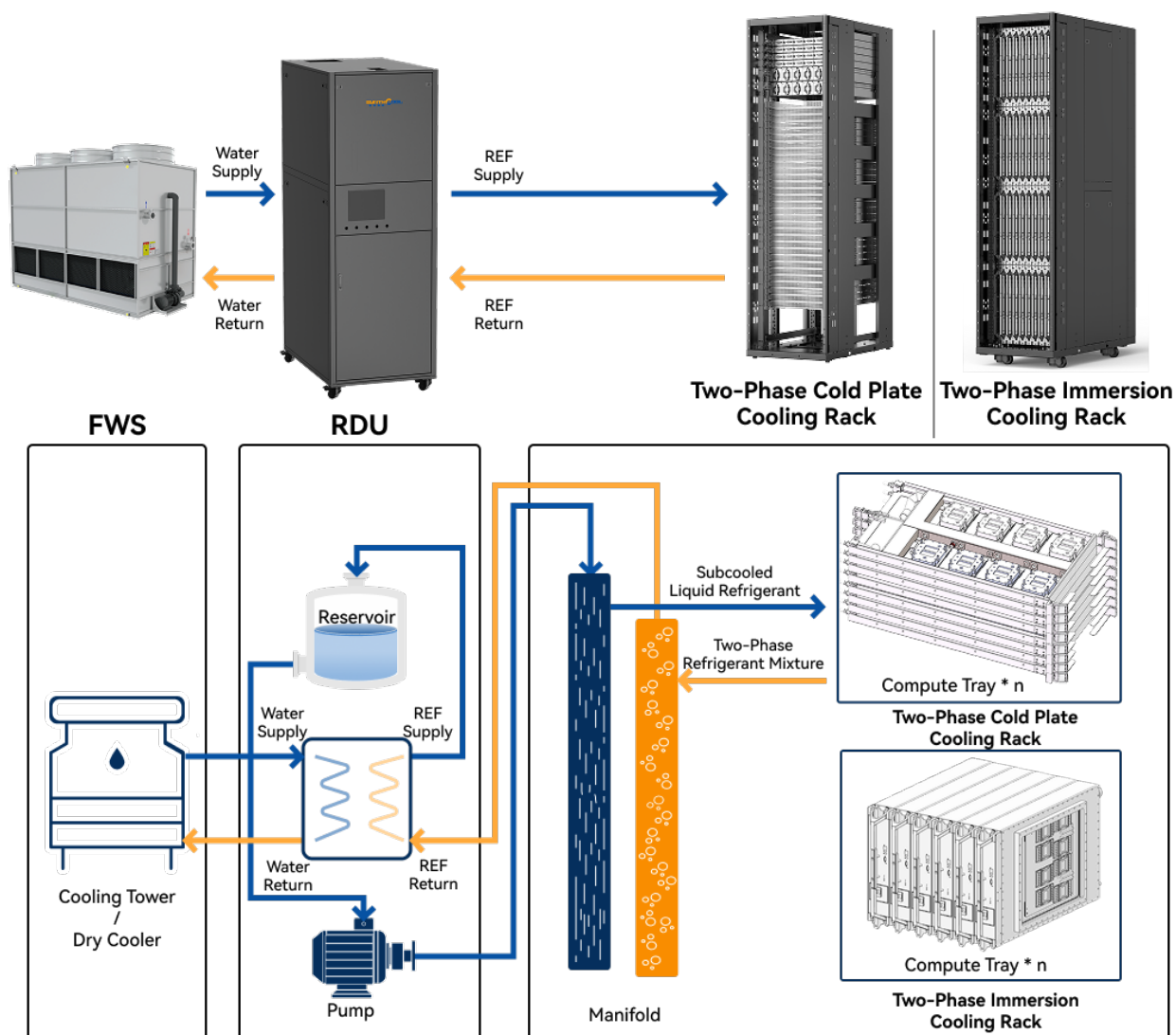


Two-Phase Cooling System Schematic

Where Does the Two-Phase Loop Fit into the Cooling Infrastructure?

How is the Two-Phase boiling process integrated into data-center cooling infrastructure?

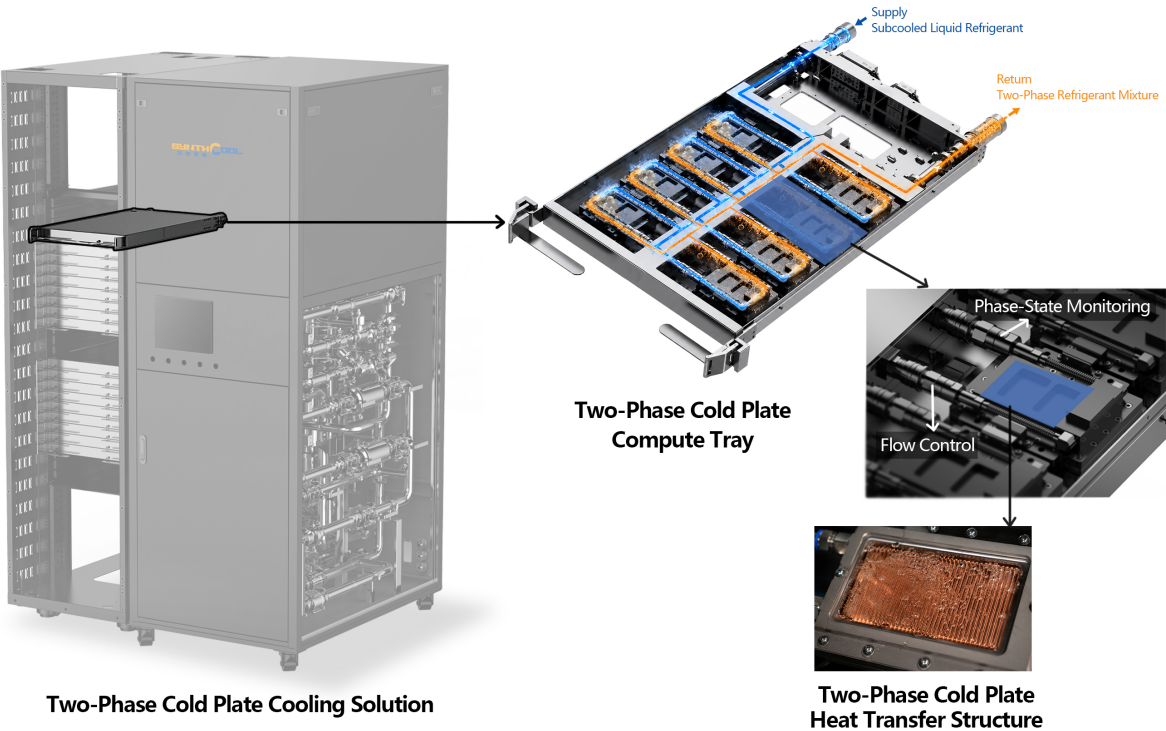
- Chip generates heat
- The Two-Phase cold plate / chamber brings the refrigerant close to the chip surface, enhancing bubble departure and liquid replenishment
- The RDU (Refrigerant Distribution Unit) drives refrigerant circulation and performs condensation heat exchange
- The PCU (Phase Control Unit) manages flow rate and phase-state control
- The facility side connects to the primary cooling system, enabling free cooling and high-density deployment.



Two-Phase Cooling System Architecture

 Two-Phase End Devices: Landau™ Dual Solutions

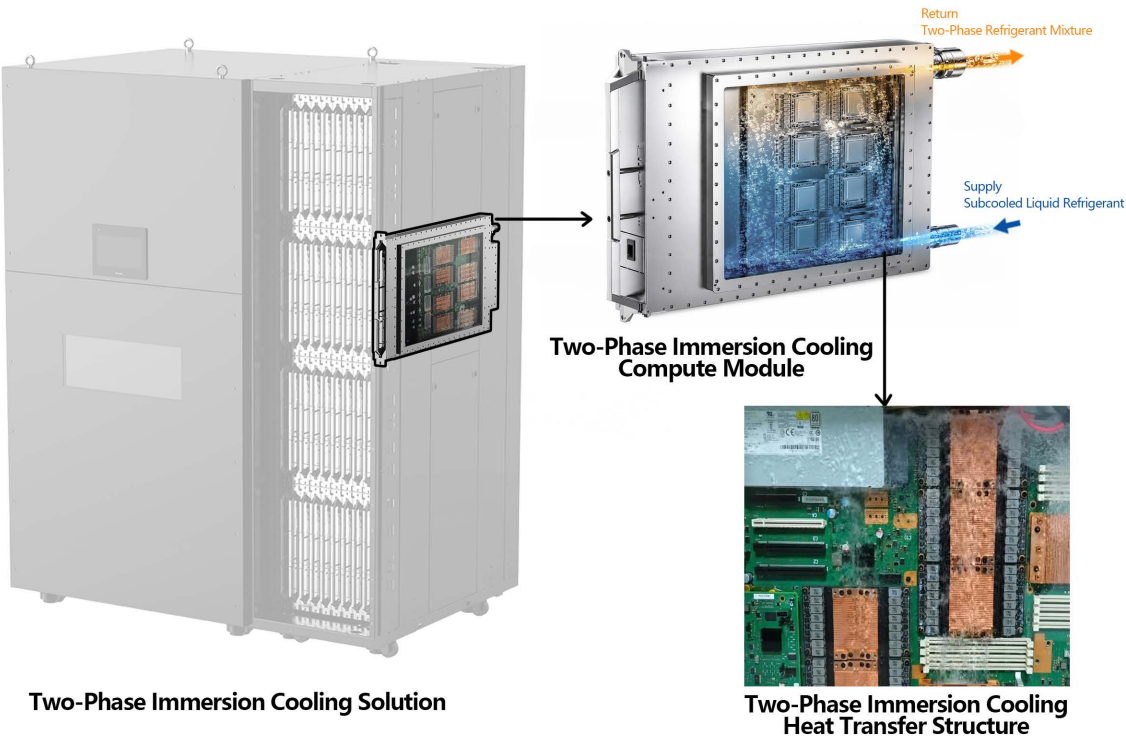
2PCP



System path	The refrigerant boils inside the cold plate and condenses in the RDU (Refrigerant Distribution Unit), forming a controllable closed loop within the rack.
Key benefits	· Supports 3000W+ cooling capacity per chip. · Requires only approximately one-third the flow rate of conventional water cold plates. · Supports in-rack, in-row, and sidecar deployment, with compatibility for both liquid-to-liquid(L2L) and liquid-to-air(L2A) cooling architectures.

 Two-Phase End Devices: Landau™ Dual Solutions

2PIC



System path	The refrigerant boils inside the server chamber. The generated vapor is transferred to the PCU (Phase Control Unit) for condensation and then pumped back into the server chamber.
Key benefits	· Supports heat fluxes above 100W/cm² and rack power densities of 200kW+. · Full-server immersion reduces fan energy consumption and airflow-management complexity.

 Two-Phase Validation: PhaseLab™ Integrated Test Platform

PhaseLab™-2PCP Integrated Test System



Phaselab™-2PCP-045



Phaselab™-2PCP-020



Phaselab™-2PCP-005

System path	Thermal Load Simulation → Two-Phase Flow Generation → Cold Plate Performance Testing → Parameter Optimization & Validation
Key benefits	· Supports thermal management testing up to 45kW. · Enables precise control of boundary conditions across multiple operating conditions. · Supports the R&D, validation, and scalable delivery of two-phase liquid cooling products.

Why SynthCool?

Two-Phase
End Cooling

Flow
Control

Phase-State
Monitoring

Intelligent
Control

Stable
Operation

▼ Complete Product Portfolio

A comprehensive product portfolio covering 2PCP two-phase cold plates, 2PIC two-phase immersion cooling, RDU, and PCU, supporting multiple deployment paths from the chip and server levels to the rack level to meet the evolving requirements of different AI computing facilities.

▼ Proprietary Core Technologies

Built on an in-depth understanding of two-phase heat-transfer mechanisms, SynthCool has developed proprietary control technologies for liquid flow, vapor flow, vapor-liquid ratio, boiling, and condensation, dynamically adapting heat transfer to changing chip loads and ensuring long-term stable operation under high heat fluxes.

▼ System State Sensing

Multiple phase-state identification capabilities are integrated throughout the system loop, enabling refrigerant state sensing, phase-transition detection, and operating-condition trend analysis under varying loads, providing the decision-making foundation for system-level closed-loop automatic control.

▼ Validation & Customization

With a comprehensive two-phase cooling test platform and professional laboratory infrastructure, SynthCool can rapidly validate and customize solutions based on customer chip power, system architecture, and deployment scenarios, accelerating deployment and commercialization.

3000W+

Cooling Capacity per Chip

Supports current and next-generation high-performance GPU/CPU platforms

250W/cm²+

High Heat Flux

Two-phase boiling heat transfer enables efficient cooling of chip-level hotspots.

200kW+

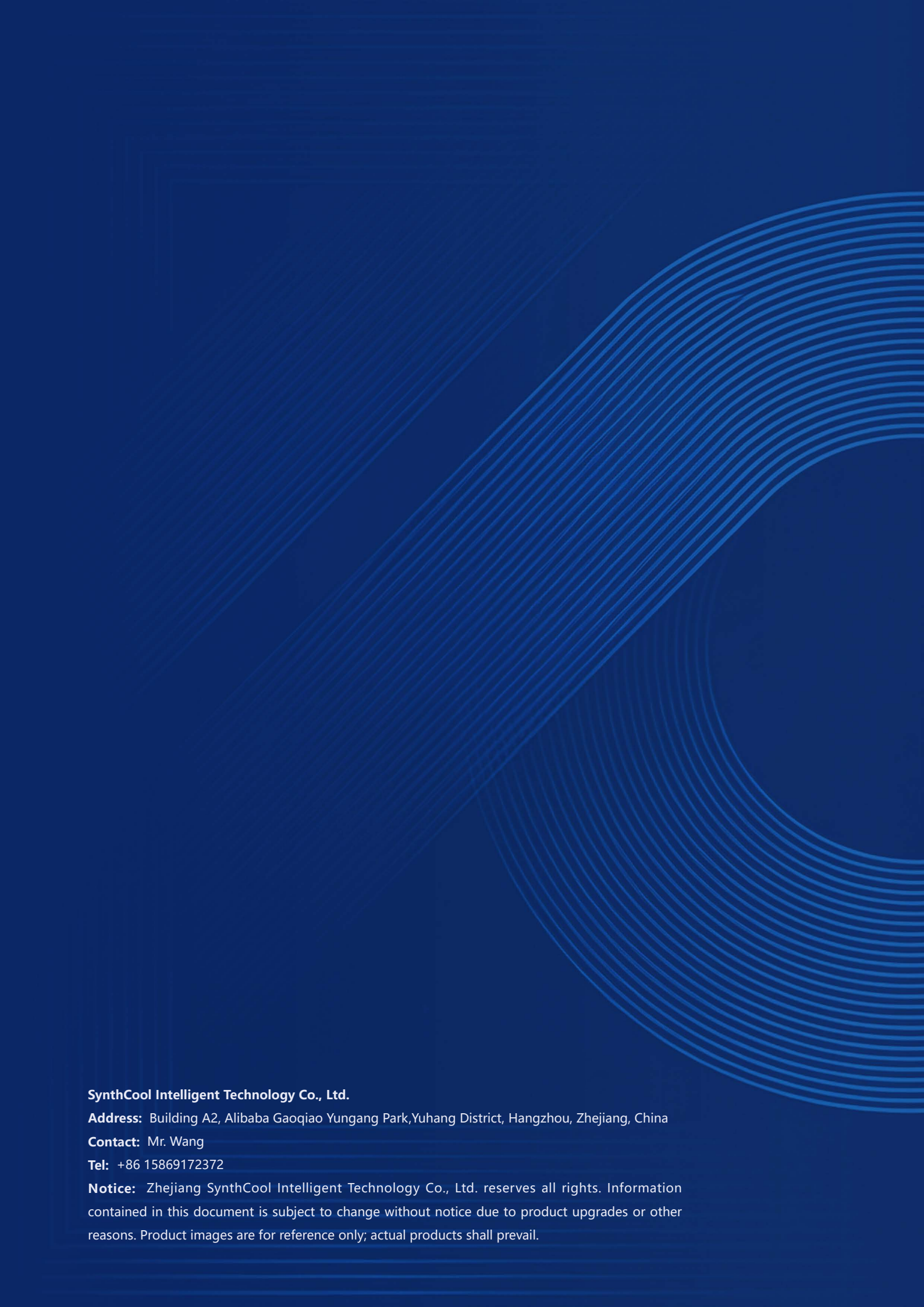
Rack Power Density

Reduces data center footprint and enables large-scale AI cluster deployment

1.05

Low pPUE

Free-cooling operation significantly reduces long-term O&M costs



SynthCool Intelligent Technology Co., Ltd.

Address: Building A2, Alibaba Gaoqiao Yungang Park, Yuhang District, Hangzhou, Zhejiang, China

Contact: Mr. Wang

Tel: +86 15869172372

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