GAMMA TECHNOLOGIES

DATA CENTER SIMULATIONS

Integrated Solutions for AI-driven Workloads, Efficiency, and Sustainability

Future of Data Centers

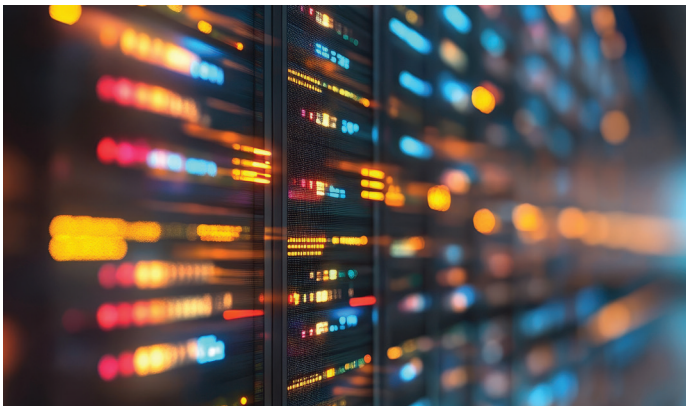
The rapid rise of AI and GPU intensive computing is creating new limits for data centers. Higher power densities demand more effective and efficient thermal and energy management solutions. As workloads scale, operators must design systems that balance performance, sustainability and reliability.

Performance, Efficiency, and PUE

Power Usage Effectiveness (PUE) is the industry's benchmark for efficiency, reflecting the ratio of IT loads to total facility energy use, beyond cooling. PUE is shaped by interconnected systems, backup power, UPS, and power conversion making it essential to view data centers holistically. The challenge: deliver the lowest possible PUE while competing with the high heat loads of modern GPU clusters. GT-SUITE delivers a unified simulation platform that allows data center engineers to model, optimize, and validate every critical system from chip-level cooling to facility-wide energy flows within a single environment.

Thermal Management at Every Level

Managing thermal performance requires solutions spanning from chip to facility. With GT-SUITE simulations, even complex thermal management evaluation and optimization is possible for:



- Direct-to-Chip & Immersion Cooling: Advanced single-and-two-phase liquid cooling solutions address the rising demands of high-power processors.
- Cooling Plates: Predict pressure drop, flow distributions, and heat transfer while resolving hot and cold spots in seconds via 1D + 3D thermal conjugate heat transfer simulations.
- Rack and Server Analysis: Evaluate airflow and thermal distribution across racks for system level balance.
- CDU (Coolant Distribution Units): Simulate pipes, pumps, valves and heat exchangers for accurate component sizing and control strategies.
- CRAC/CRAH & Pre-Cooling Systems: Model complex transient flow between chillers, thermal storage and pumps to proactively optimize system performance.

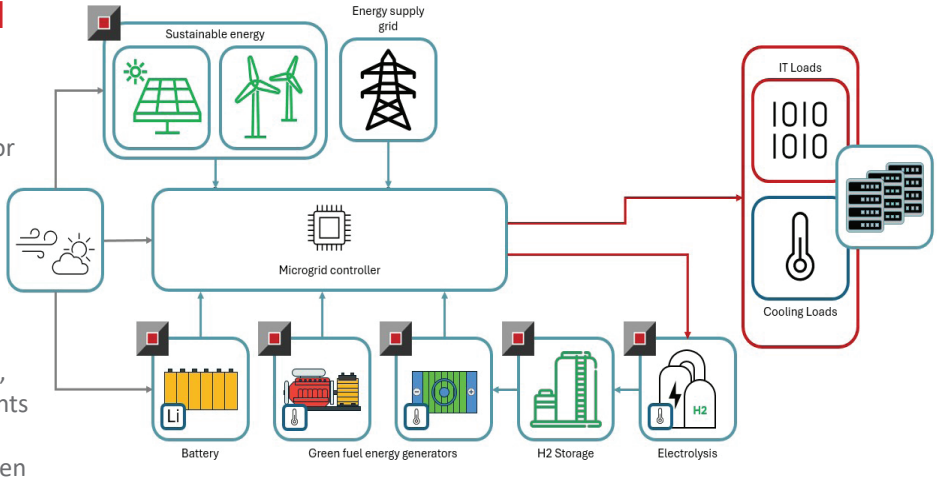
Facility Load and Energy Management

Facility load modeling extends beyond cooling to energy generation, conversion, storage and rejection. GT-SUITE allows engineers to simulate and optimize PUE, controls and thermal management strategies in an integrated, transient system by modeling energy flows and taking into account all power sources in a microgrid, all while considering retrofit scenarios and cost constraints. Integrated designs enable seamless interaction between cooling infrastructure, IT loads, power distribution, and active controls empowering operators to fine-tune daily performance and troubleshoot issues with precision.

Reliable Power & Emissions Control

Backup power systems remain essential for uptime. GT-SUITE provides robust modeling for:

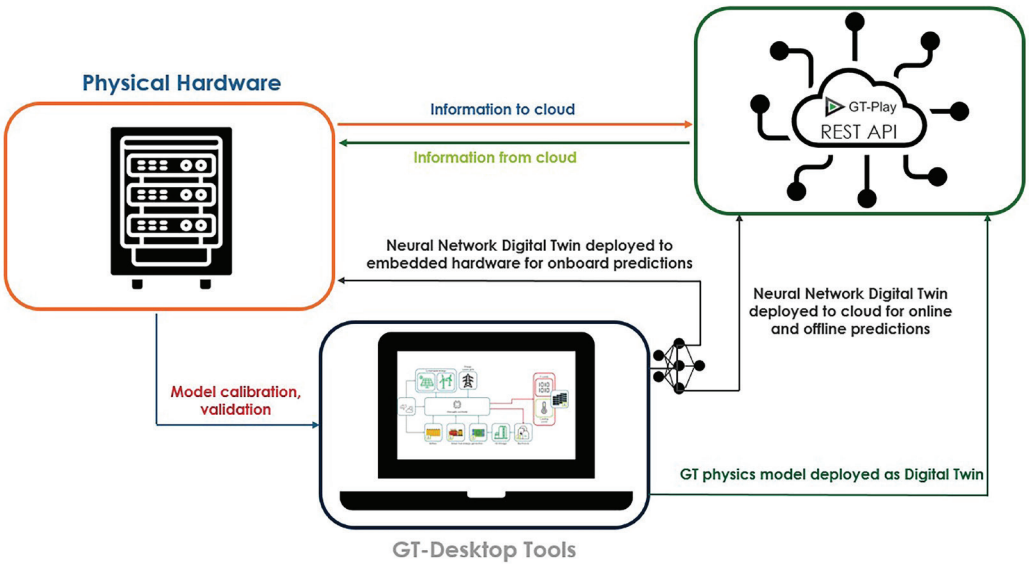
- Engine Integration & Optimization: Improve generator performance, reduce fuel consumption and explore hydrogen or alternative fuels.
- Aftertreatment Systems: Design compliant exhaust treatment systems to reduce NOx and particulate emissions while maintaining engine reliability.
- Battery Energy Storage: Predict electrochemical and thermal performance at cell, module and pack levels, accounting for degradation, safety and transient events such as thermal runaway.
- Hydrogen & Fuel Cells: Support the complete hydrogen cycle; from electrolysis for hydrogen production to storage to fuel cell conversion providing detailed physics-based insights into system performance, degradation and control strategies.



Holistic Data Center Thermal, Energy and Emissions Management Enabled Through GT-SUITE Multi-Physics

Digital Twin for Smarter Operations

The complexity of modern data centers requires digital tools that connect design with real world operations. GT-Play enables users of varying experience levels to access existing library of GT-SUITE simulation models directly through any web-connected devices, performing parameter sweeps or optimizations and post processing results without the need for expensive hardware or complex licensing solution.



GT Solutions for Cloud-Enabled Digital Twin Monitoring

GammaTech Engineering

GammaTech Engineering (GTE) offers specialized simulation services built on deep expertise in system-level modeling with GT-SUITE. Whether you're tackling heat exchanger and cooling systems design, engine optimization, or microgrid integration, GTE brings turnkey solutions that enhance thermal, energy, and emissions performance. Backed by rigorous physics-based modeling and real-world engineering experience, our consultants help you translate advanced simulation into measurable results across your data center infrastructure.

GTE

About Us!

GT Data Center Solutions

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