

A FASTER PATH FROM SIMULATION TO INNOVATION

MATNEX ACCELERATES NOVEL MATERIALS DISCOVERY WITH 3.5 TIMES FASTER PERFORMANCE

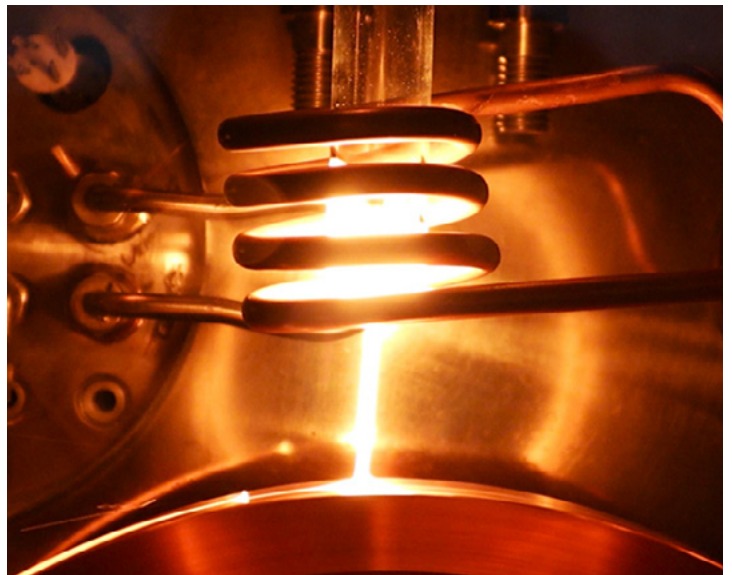
CUSTOMER

Materials Nexus (Matnex) is an AI-driven materials science company focused on accelerating the discovery of new materials for advanced, sustainable applications. By combining machine learning and physics-based modeling, Matnex can design and validate novel materials significantly faster than with traditional approaches.

CHALLENGE

As Matnex scaled its computational workloads, its hybrid environment combining a self-managed on-premises cluster with public cloud resources became increasingly complex to manage. While effective for early-stage R&D, it was not optimized for more advanced simulations. Highly variable workloads, from short runs to multi-week CPU and GPU jobs, made it difficult to consistently allocate resources and maintain performance. Without external benchmarking, it was difficult to fully assess performance or identify additional opportunities for optimization.

At the same time, managing in-house infrastructure added operational overhead, requiring teams to balance system management with ongoing research. As Matnex entered a new phase of growth, with increasing compute demands and more sustained workloads, the company began evaluating how best to scale its compute strategy for the future. Matnex sought a more scalable and predictable approach that could improve performance and resource utilization while supporting continued innovation without disrupting active R&D.



Matnex's AI platform searches for new elemental compositions that solve critical material challenges. Image courtesy of Matnex.

SOLUTION

Viridien designed and delivered a fully managed and hosted HPC environment, tailored to support Matnex's evolving workloads and growth. The engagement began with a benchmark proof of concept, where Viridien's HPC & Cloud Solutions specialists demonstrated significant runtime improvements across a range of workloads. The results revealed opportunities to further improve performance, validating the impact of a more optimized approach and enabling a seamless transition without disrupting existing workflows.

To maximize performance across diverse workloads, Viridien applied optimization across the full compute stack, including scheduling, resource allocation, CPU and GPU efficiency, memory usage and parallel processing. Critically, these gains were achieved without requiring changes to Matnex's scientific applications or workflows, allowing teams to immediately benefit from improved performance while maintaining their existing high-throughput screening environment.

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RESULTS

**3.5X**

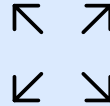
Faster

PERFORMANCE

**70%**

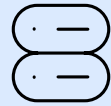
Savings

THROUGH PARTNERSHIP

**2X**

CPU resource

CAPACITY

**7X**

GPU resource

CAPACITY

The partnership delivered clear, measurable impact across performance, productivity, and scalability:

- More screening loop iterations per day, accelerating materials discovery cycles
- Increased throughput, enabling more simulations to run in parallel
- Reduced infrastructure complexity and operational overhead
- Access to specialized HPC expertise and continuous optimization across the compute stack
- A scalable compute foundation designed to support future growth and increasing workload demands
- Greater cost predictability through a scalable compute model, enabling more effective planning as workloads grow
- Estimated to deliver ~70% savings through the compute partnership, resulting in multi-million-dollar cost savings.

With faster turnaround times and improved efficiency, Matnex can validate ideas earlier, run more experiments and focus on high-value scientific work. By combining infrastructure, HPC expertise, continuous optimization and a predictable compute model, Viridien provides a scalable foundation that enables Matnex to support future growth while maximizing the value of its compute environment.



MatNex uses AI and advanced physics simulations to discover and develop new materials faster. The scale of the problem is enormous: there are more possible materials than there are atoms in the universe to make them all. We've built the data-generation methods, search algorithms and automation needed to navigate that space effectively. Our platform has already generated hundreds of millions of simulated material properties, and can now map out novel materials spaces around ten times faster than ever before. Compute is central to that process, so improvements in performance translate directly into faster discovery cycles. Working with Viridien, with their fully managed cloud and expertise in optimisation, has made key parts of our high-throughput screening around 3.5x faster, allowing us to evaluate more possibilities, reach the strongest candidates sooner and shorten the path from discovery to customer impact.

— **Dr Robert Forrest, CTO & Co-founder, MatNex**