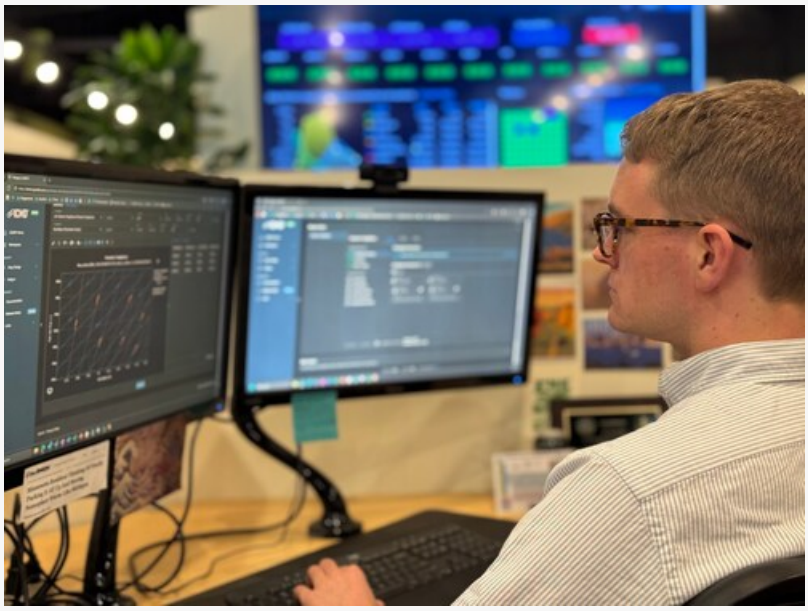
QuesTek Publishes Peer-Reviewed Research Advancing Predictive Materials Design for Reusable Rocket Engines

New research demonstrates how predictive materials design can help engineers overcome competing performance requirements in next-generation rocket propulsion.



QuesTek engineers use ICMD® software to computationally design and optimize advanced materials, including novel superalloys developed for reusable rocket engines.

EVANSTON, IL, UNITED STATES, July 21, 2026 /EINPresswire.com/ -- QuesTek Innovations today announced the publication of a new peer-reviewed research article showing how Integrated Computational Materials Engineering (ICME) can accelerate the development of advanced materials for reusable rocket engines. The research, authored by Gary Whelan and Abhinav Saboo, showcases QuesTek's approach to designing materials for the demanding performance requirements of next-generation rocket propulsion systems.

Published in the Journal of Materials Engineering and Performance, the paper, Using ICME to Design a Novel High-Strength, Printable, and Burn-Resistant Nickel-Based Superalloy for Reusable Rocket Engines, presents the design of Sunaloy, a novel nickel-based superalloy developed for reusable rocket engines.

As reusable launch systems continue pushing performance boundaries, engineers are increasingly challenged to develop materials that combine high strength, resistance to oxygen-rich combustion environments, and compatibility with additive manufacturing. These competing requirements have traditionally required extensive testing and iterative experimentation.

The published research demonstrates how QuesTek's Materials by Design® technology, delivered

through the ICMD® software platform, enables engineers to computationally evaluate complex material design challenges before physical production. By integrating proven physics-based models, the team designed and optimized Sunaloy while reducing reliance on conventional trial-and-error development.

"Our goal is to enable engineers to design application-specific materials, during the systems design, to enable entirely new design choices, rather than limiting innovation to designs that fit a table of existing materials," said Gary Whelan, director of research and development. "This research demonstrates how predictive materials design can fundamentally change the way rockets, amongst other high-performance systems, are developed."
While the research focuses on reusable rocket propulsion, the methodology extends well beyond aerospace. The same computational approach can be applied to materials challenges across defense, energy, additive manufacturing, transportation, and other industries where multiple performance requirements must be optimized simultaneously.

The full peer-reviewed paper, Using ICME to Design a Novel High-Strength, Printable, and Burn-Resistant Nickel-Based Superalloy for Reusable Rocket Engines, is available through Springer Nature.

About QuesTek
QuesTek's Materials by Design® technology and ICMD® software platform are proven to reduce the development time and cost and increase the performance of novel materials. In its market space, QuesTek is the first provider to execute the full cycle from novel design to production, certification, and flight operations with proprietary materials, in a fraction of the time and cost of traditional, or purely algorithmic methods. Fast Company named QuesTek a 2025 Most Innovative Company. questek.com

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