GE Aerospace

Hypersonics

Time travel is no longer just an idea

Imagine the day when you could fly from New York City to Los Angeles in under an hour and, with the time difference, literally arrive two hours before you left. That day is coming, and sooner than we think, as next generation propulsion technologies and other supporting innovations begin to take flight. Ultimately, we see the potential for average commercial flight speeds to rise from subsonic today to five times the speed of sound in the ensuing decades.

GE Aerospace, Research Technology Portfolio:

Rotating Detonation Engine (RDE) Technology:
GE has been developing RDEs for many years, starting with work on the Advanced Turbine Technologies for Affordable Mission-Capability (ATTAM) PGP program. This follows more than a decade of work with NASA and other research partners in pulsed detonation engine (PDE) technologies. RDEs, which enable a 5X increase in combustion rates and smaller, more compact engine designs, still carry many technical risks. But GE Aerospace researchers have made significant progress to understand how to apply this technology to achieve dramatic improvements in propulsion system performance.

High Temperature Materials:
Scientists and engineers at GE Aerospace, Research and our Aerospace business were the first to develop and deploy high temperature ceramic matrix composites (CMCs) into commercial jet engines. The shrouds surrounding the hot gas path of GE's CFM-LEAP engine for narrow body aircraft are made of this watershed material. Advanced materials for space travel that is more durable and can withstand hotter temperatures will be required to support the faster and more advanced propulsion platforms like RDE that are on the horizon.

Thermal Management:
We have spent decades designing sophisticated new systems for managing the heat inside GE's turbomachinery products. With temperatures inside these systems often exceeding the thresholds of what materials can withstand, we employ a combination of advanced cooling systems, materials, and thermal barrier coatings on parts to keep engines running safely and reliably.

3D designed and Printed Parts: GE Aerospace researchers are currently designing a new heat exchanger using a 3D printing processes that will be lower in weight and able to create more efficient heat transfer through an engine platform.

Noise Reduction Technologies:
With higher speeds through the air come new issues like the sonic boom phenomena, which occurs during super or hypersonic flight, as well as the excess noise these airplanes generate during take-off. GE Aerospace, Research has some of the world's top specialists in computational fluid dynamics (CFD) who have been working with NASA and others on this very challenge. The team also can leverage learnings from GE's Aerospace and Wind businesses in reducing noise from jet engines and wind turbines.

What's Next

GE Aerospace, Research has driven the development of advanced propulsion, materials, and other supporting technologies in GE Aerospace for many decades. From engine design to advanced materials ranging from super metal alloys to CMCs, our contributions have helped improve the safety and reliability of flight. We have also helped expand air travel from 31 million people in 1950 to more than four billion passengers globally last year.

Together with other aviation industry partners, we are working on the next generation of technologies to make air travel more accessible than ever before.

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