



UNIMPOSSIBLE MISSIONS: THE UNIVERSITY EDITION GLOBAL RESEARCH CENTER TECHNOLOGY TOOLKIT

THE GE GLOBAL RESEARCH CENTER

One of the cornerstones of GE, our Global Research Centers were inspired by Thomas Edison and created to maintain the company's market edge and to foster new discoveries and commercial applications. From one of our many [locations](#) across the globe, we are constantly seeking new technologies and inventions—from bioscience to fluid mechanics to imaging and beyond.

Below is a list of some of the unique capabilities from our Global Research Centers. **Imagine you have access to GE's unique technologies and expertise—and tell us how you'd apply them to solve your impossible mission!**

A FEW OF OUR GE TECHNOLOGIES

- **Ceramic Matrix Composites (CMC)**—This ceramic-based material was engineered with GE proprietary technology by GE scientists to exhibit the strength of metal while exploiting the extreme heat tolerances of ceramics. It is currently used in GE aircraft engines.
 - Learn more about CMCs [here](#) and [here](#).
- **Polymer Matrix Composites (PMC)**—This novel material is comprised of a variety of short or continuous fibers bound together by an organic polymer matrix. GE was the first jet engine maker to commercialize engines with carbon fiber (polymer) composites in the fan blade and later in the engine's containment case. They are valued for their stiffness, lightness and heat resistance qualities. GE has deep

experience not only in engineering and manufacturing parts using the material, but also in automating that process.

- **Watch a video about the strength of these super materials [here](#).**
- **Silicon Carbide**—As a successor to silicon, this material can reduce power losses by half for next generation power devices that regulate and move power through electrical machines of all kinds.
 - **Learn more about Silicon Carbide’s development and applications [here](#) and [here](#).**
- **Digital Twin**—The Digital Twin is a GE software model that combines deep knowledge of a product’s individual parts and each part’s unique lifecycles with digital tools like data lakes, model infrastructure, visualization, estimation, controls, and specialized analytics such as operations optimization and maintenance work. The outcome is a machine model that operates and updates itself from sensor data, providing asset-specific knowledge to help companies achieve better asset performance with lower maintenance costs.
 - **Learn more about Digital Twin [here](#) and [here](#).**
- **High-Temperature Metal Alloys & Other Assorted Metals**—GE scientists have engineered novel metal materials for applications including jet engines and other turbomachinery. The focus has been on increasing strength and temperature tolerance in turbomachinery like aircraft engines and power generation turbines.
- **Additive Materials**—GE scientists are developing new materials using additive techniques that work with powder-based metals and liquid materials. These materials allow our researchers to print parts with complex, highly optimized designs that are impossible to produce through traditional methods like machining. These parts are also lightweight, a huge advantage in industries like Aviation.
 - **Learn more about Additive Materials [here](#), [here](#) and [here](#).**
- **Inspection & Imaging Technologies (CT, MR, X-ray, & Ultrasound)**—GE’s Global Research Center houses the latest in imaging technologies adapted for both industrial inspection and medical applications. GE is constantly innovating new applications and new capabilities for their imaging equipment, from handheld ultrasound probes, to CT scanners that are combined with PET scanners to the latest in MRI technology.
 - **Learn more about Industrial Inspection [here](#) and [here](#).**

ADVANCED CAPABILITIES

- **Supercomputing Capabilities**—GE has supercomputing resources in-house that enable their scientists to perform experiments and make calculations in a greatly accelerated timeframe. From modeling machinery to analyzing experimental results, their supercomputing capabilities are at the center of much of the work they do.

- Learn more about our work in Supercomputing [here](#).
- **Virtual Design & Engineering Tools** (Brilliant Factory)—These tools allow an individual to virtually design, engineer, and test the producibility of a part of product before a physical part is ever created. GE has designed perfectly optimized parts for a pieces equipment like a turbine and are able to instantly determine whether it meets all of the turbines requirements and that it's also producible in their factories.
 - Learn more about the Brilliant Factory [here](#), [here](#) and [here](#).
- **Thermal Management**—GE's team has some of the world's foremost experts in managing the thermal dynamics of turbomachinery, which include jet engines and power generation turbines. The researchers who figured out how [to send a snowball safely to hell and back](#) used their expertise to ensure GE's turbomachinery can not only withstand extreme temperatures, but can perform efficiently in them.
 - Learn more about Thermal Management [here](#) and [here](#).
- **Mechanical Design**—GE's world-class Mechanical Design team specializes in manufacturing processes and various analysis and measurement tools to properly design complex industrial parts and systems. From perfecting the curve of a blade on an aircraft engine to optimizing the design of a newborn warming bed for use in the developing world, our researchers excel at tackling difficult and unique design challenges.
 - Learn more about Mechanical Design [here](#) and see a unique application of design expertise [here](#).
- **Advanced Materials Characterization**—GE has some of the most powerful microscopes and measurement tools at their disposal to study material properties in great depth. This ensures materials will have the necessary characteristics to meet high-threshold product specifications.
 - Learn more about Materials Characterization [here](#) and [here](#).

A FINAL NOTE

You'll need to use at least one (*feel free to use multiple*) **GE technology in your submission... but this is by no means a comprehensive list!** Every day scientists at the GRC are hard at work developing new arterials and techniques to push the boundaries of science and technology.