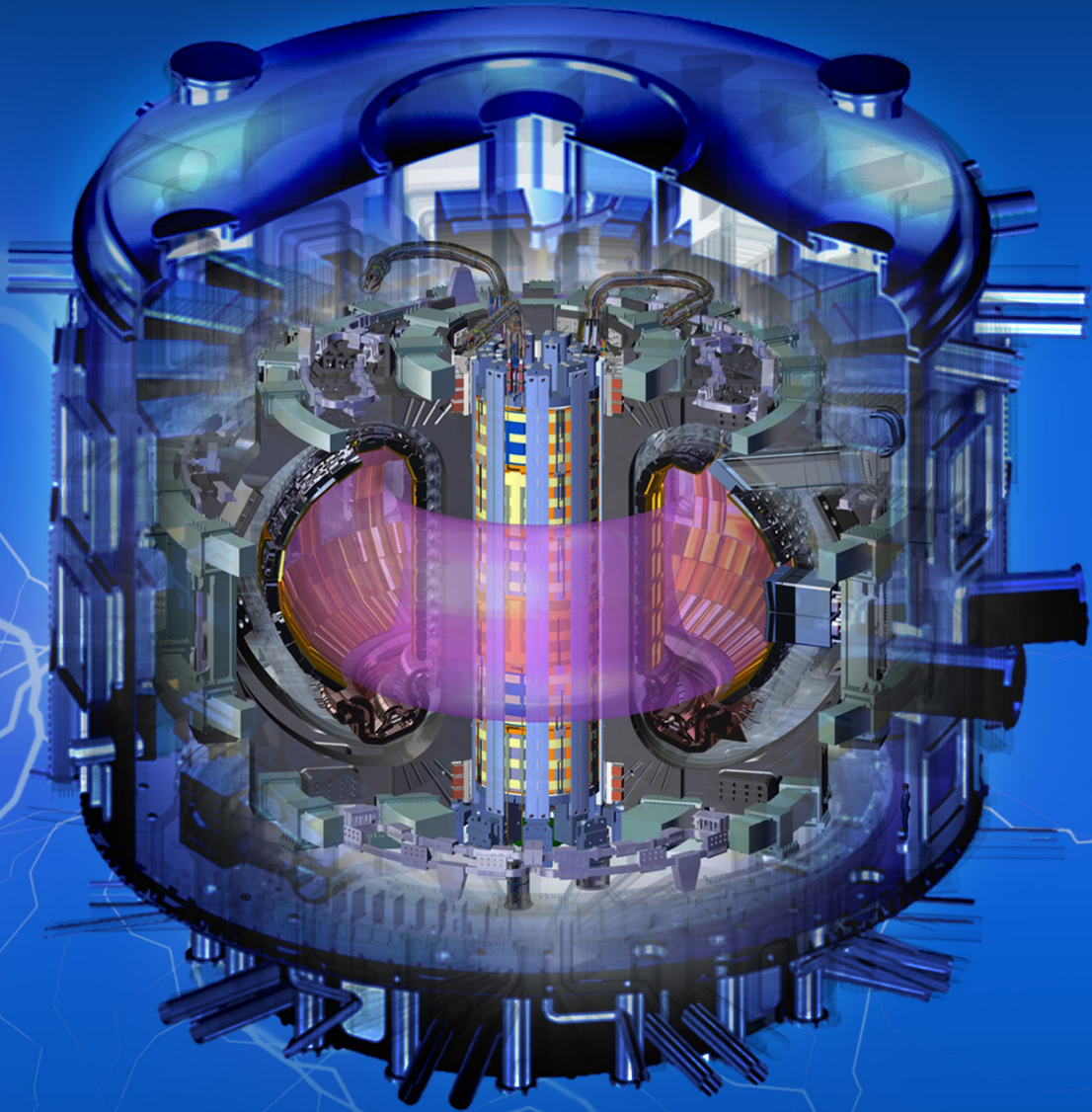


# ITER CENTRAL SOLENOID

*The heart of the international fusion energy device*

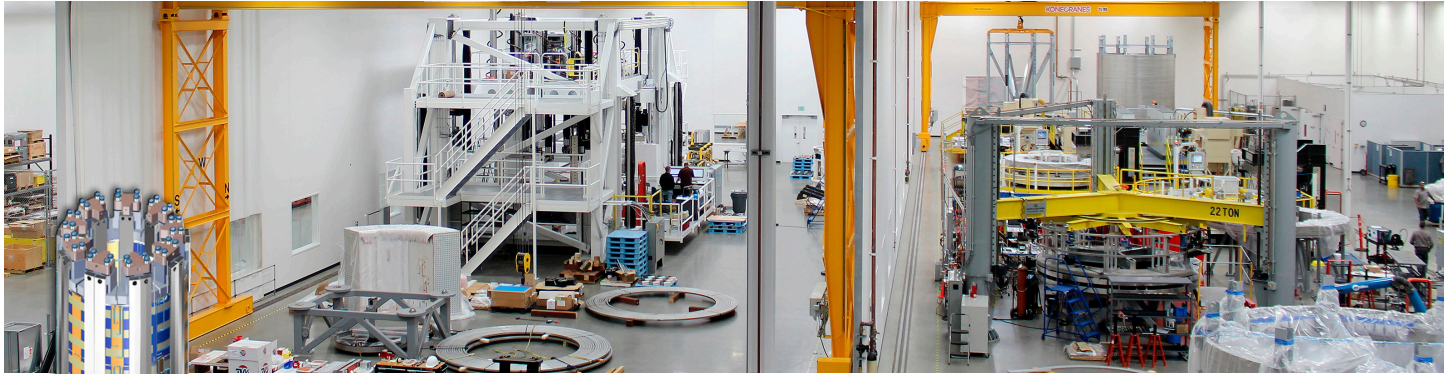


**General Atomics is fabricating one of the world's largest and most powerful superconducting magnets for ITER – an unprecedented scientific collaboration of 35 nations.**

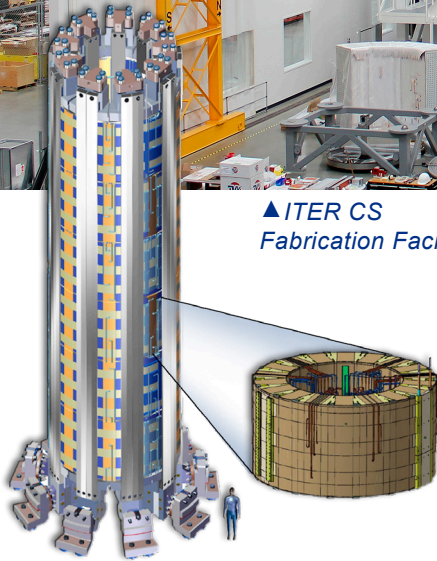
The Central Solenoid is the heart of ITER. The five-story, 1,000-ton magnet consists of ~22 miles of superconducting cables assembled within a few tenths of an inch accuracy. This magnet will drive 15 million amperes of electrical current in ITER's plasma, powering ITER in its quest to prove that nuclear fusion – the process that powers the stars – can produce virtually limitless, safe, clean and renewable energy.



# SCIENCE AND TECHNOLOGY FOR ITER



▲ ITER CS  
Fabrication Facility



ITER Central Solenoid consists of six modules and a structure with an overall height of 59 feet



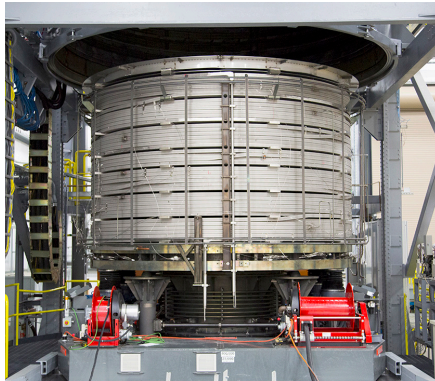
Superconductor is wound to high tolerance

## ITER CENTRAL SOLENOID PRECISION FABRICATION PROCESSES

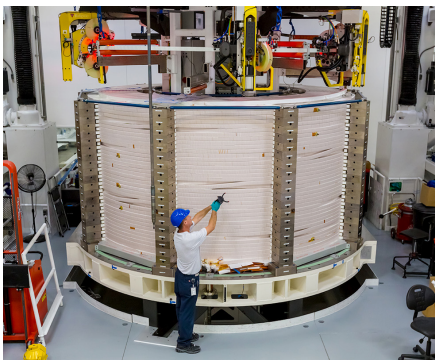
- **Winding:** For each of the six modules, 3.6 miles of 2-inch square superconductor is wound to high accuracy to form a coil 14 feet in diameter and seven feet tall
- **Heating:** Formed module is processed in a convection furnace to create the superconducting alloy. The month-long process includes heating to 1,200° F and holding at critical temperatures for over 350 hours
- **Insulating:** The 560-turn, 250,000-pound coil is lifted and the turns are separated to apply 180 miles of insulating tape in six layers
- **Encapsulating:** The coil is placed in a mold, then warmed to 125° F for injection of 1,000 gallons of epoxy
- **Testing:** Magnet coils are cooled to -450° F (4 K) and tested at a current of 48,500 Amps to simulate ITER Operations

## OTHER ITER TECHNOLOGIES

- Low-energy-loss, high-power microwave transmission line components
- Software for real-time plasma control
- Methods to prevent uncontrolled collapse of ITER plasmas and high-energy bursts from plasma edge using internal stabilization coils
- Low Field Side Reflectometer: A diagnostic using microwaves to measure plasma density profiles
- Wide Angle Visible & Infrared Viewing System: Set of diagnostic cameras to monitor for hot spots in ITER plasma chamber
- Toroidal Interferometer Polarimeter: Diagnostic to measure plasma density distribution
- Archiving methods for storing ITER experimental data



Module 2 in the heat treatment furnace



Turn insulation of module nearing completion

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