NASA's next generation space telescope marks key milestone

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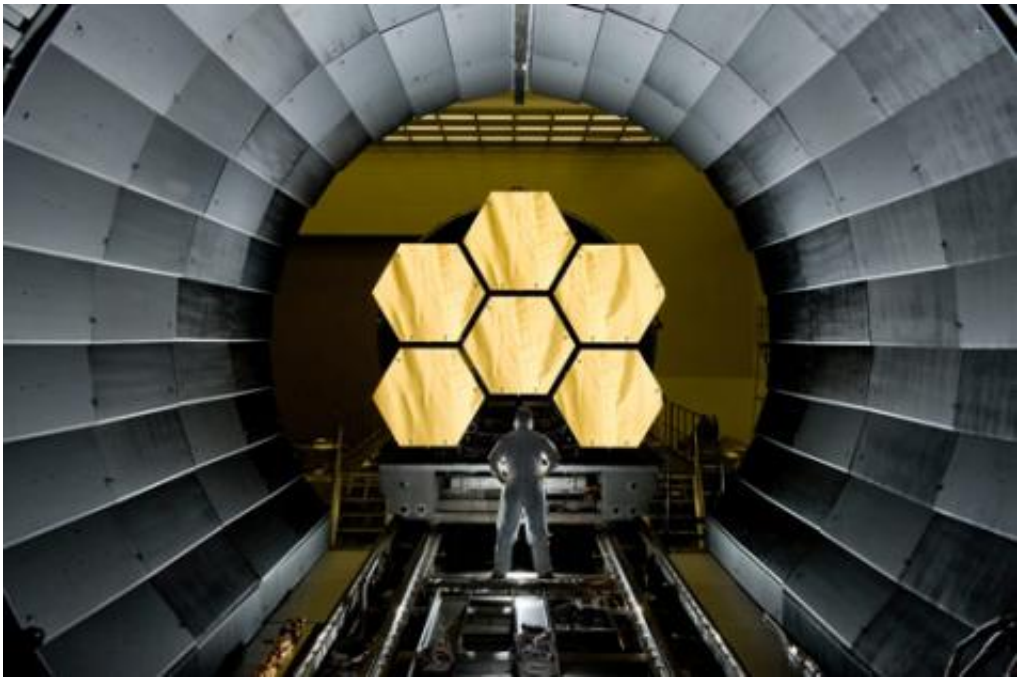

NASA engineer Ernie Wright looks on as the first six flight ready James Webb Space Telescope's primary mirror segments are prepped to begin final cryogenic testing at NASA's Marshall Space Flight Center in Huntsville, Ala. (NASA/MSFC/David Higginbotham)

(PhysOrg.com) -- The first six of 18 segments that will form NASA's James Webb Space Telescope's primary mirror for space observations will begin final round-the-clock cryogenic testing this week. These tests will confirm the mirrors will respond as expected to the extreme

temperatures of space prior to integration into the telescope's permanent housing structure.

The X-ray and Cryogenic Facility at NASA's Marshall Space Flight Center in Huntsville, Ala. will provide the space-like environment to help engineers measure how well the telescope will image infrared sources once in orbit.

Each mirror segment measures approximately 4.3 feet (1.3 meters) in diameter to form the 21.3 foot (6.5 meters), hexagonal telescope mirror assembly critical for infrared observations. Each of the 18 hexagonal-shaped mirror assemblies weighs approximately 88 pounds (40 kilograms). The mirrors are made of a light and strong metal called beryllium, and coated with a microscopically thin coat of gold to enable the mirror to efficiently collect light.

"The six flight mirrors sitting ready for cryogenic acceptance tests have been carefully polished to their exact prescriptions," said Helen Cole, project manager for Webb activities at Marshall. "It's taken the entire mirror development team, including all the partners, over eight years of fabrication, polishing and cryogenic testing to get to this point."

During cryogenic testing, the mirrors are subjected to extreme temperatures dipping to minus 415 degrees Fahrenheit (-248C) in a 7,600 cubic-foot (approximately 215 cubic meters) helium-cooled vacuum chamber. This permits engineers to measure in extreme detail how the shape of the mirror changes as it cools. This simulates the actual processes each mirror will undergo as it changes shape over a range of operational temperatures in space.

"This final cryotest is expected to confirm the exacting processes that have resulted in flight mirrors manufactured to tolerances as tight as 20

nanometers, or less than one millionth of an inch," said Scott Texter, Webb Optical Telescope element manager at Northrop Grumman in Redondo Beach, Calif.

A second set of six mirror assemblies will arrive at Marshall in July to begin testing, and the final set of six will arrive during the fall.
The Webb Telescope is NASA's next-generation space observatory and successor to the Hubble Space Telescope. The most powerful space telescope designed, Webb will observe the most distant objects in the universe, provide images of the very first galaxies ever formed and help identify unexplored planets around distant stars. The telescope will orbit approximately one million miles from Earth.

"The Webb telescope continues to make good technological progress," said Rick Howard, JWST Program Director in Washington. "We're currently developing a new baseline cost and schedule to ensure the success of the program."

The telescope is a combined project of NASA, the European Space Agency and the Canadian Space Agency. Northrop Grumman is the prime contractor under NASA's Goddard Space Flight Center in Greenbelt, Md. Ball Aerospace & Technologies Corp. in Boulder, Colo., is responsible for mirror development. L-3- Tinsley Laboratories Inc. in Richmond, Calif. is responsible for mirror grinding and polishing.

Provided by JPL/NASA