NASAFacts

Space Shuttle Discovery (STS-121)

The launch of NASA's Space Shuttle Discovery and its seven-member crew will mark the second mission in the Return to Flight sequence. The mission, designated STS-121, will test shuttle safety improvements to build on findings from Discovery's flight last year. The improvements include a redesign of the shuttle external fuel tank's foam insulation, in-flight inspection of the shuttle's heat shield, improved imagery during launch and the ability to launch a shuttle rescue mission if needed. The STS-121 mission also will bolster the International Space Station, making a key repair and delivering more than 28,000 pounds of equipment and supplies, as well as a third crew member. Two spacewalks are planned during Discovery's 12-day mission. If there is enough electrical power, the mission will be extended by one day and a third spacewalk will be added. Shuttle managers hope to make that decision by flight day 6.

The STS-121 patch depicts the space shuttle docked with the International Space Station in the foreground, overlaying the astronaut symbol with three gold columns and a gold star. The background shows Earth at nighttime with dawn breaking over the horizon.

Mission Highlights

- Shuttle Backflip: As it nears the station, the shuttle will perform a backflip so the station's crew can photograph its belly to see whether the shuttle's heat shield, known as the thermal protection system, is damaged. This tricky maneuver was first demonstrated on STS-114.
- Two/Three Spacewalks: Each will last approximately 6.5 hours. Astronauts will:
  - Test the 50-foot robotic arm boom extension as a work platform.
  - Remove and replace a cable that provides power, command and data and video connections to the station's mobile transporter rail car. The transporter is used to move a platform containing the station's robotic arm along the truss of the complex.
  - (Tentative) Test techniques for inspecting and repairing the reinforced carbon-carbon segments that protect the shuttle's nose cone and leading edge of the wings.
- Improved Imagery: STS-121 will be NASA's most-photographed mission in shuttle history. More than 100 high definition, digital, video and film cameras will help assess whether any debris comes off the external tank during the shuttle's launch
  - Four new video cameras have been added to the solid rocket boosters.
- New Station Crew Member: With the addition of European Space Agency astronaut Thomas Reiter, the station will have three crew members for the first time since May 2003.

Changes and Modification

Shuttle

- Gap Fillers: NASA developed new procedures to ensure gap fillers between the heat-shielding tiles stay in place and pose no hazard on re-entry. Technicians removed and replaced approximately 5,000 of the shuttle's 16,000 gap fillers prior to launch.
- New Tile: Technicians have installed hardened tiles on Discovery's nose landing gear doors, a vulnerable area if it's impacted.
- Improved Tires: Discovery's main landing gear now has four larger, smoother tires that can

withstand higher loads at landing than the previous tires.

External Tank

- PAL Ramps: Discovery's tank, known as ET-119, is the first to fly without the protuberance air load ramps. During last year's shuttle launch, a piece of foam came loose from this area. After detailed inspections, engineering analysis and testing, the Space Shuttle Program determined the PAL ramps were not necessary and it would be a safety improvement to remove the ramps. This is the biggest aerodynamic change to the tank in the shuttle's history.
- Ice/Frost Ramps: Small foam ramps, known as extensions, were added to the ice/frost ramp locations where the PAL ramps used to be. These extensions make the geometry of these ice/frost ramps consistent with the rest of the tank. There are 35 ice/frost ramps on the tank.

STS121-S-002 (5 April 2006) - These seven astronauts take a break from training to pose for the STS-121 crew portrait. From the left are astronauts Stephanie D. Wilson, Michael E. Fossum, both mission specialists; Steven W. Lindsey, commander; Piers J. Sellers, mission specialist; Mark E. Kelly, pilot; European Space Agency (ESA) astronaut Thomas Reiter of Germany; and Lisa M. Nowak, both mission specialists. The crewmembers are attired in training versions of their shuttle launch and entry suit.

Crew

Steve Lindsey

(Colonel, USAF), Commander

- Veteran of three spaceflights, mission commander on STS-104 in 2001
- Age: 45, born in Arcadia, Calif., enjoys camping and mountain/dirt biking

Mark Kelly

(Commander, USN), Pilot

- Veteran of one spaceflight, will guide spacewalkers
- Age: 41, born in Orange, N.J., enjoys cycling, weight-lifting and golf

Piers Sellers

(Ph.D.), Mission Specialist

- Veteran of one spaceflight, lead spacewalker
- Age: 50, born in United Kingdom, enjoys sailing with his son

Mike Fossum

(Lt. Colonel, USAF Reserves), Mission Specialist

- First spaceflight, will perform two or three spacewalks
- Age: 48, born in Sioux Falls, S.D., enjoys family activities and fishing

Lisa Nowak

(Commander, USN), Mission Specialist

- First spaceflight, will operate shuttle robotic arm during first spacewalk
- Age: 42, born in Washington, D.C., enjoys crossword puzzles and playing piano

Stephanie Wilson

Mission Specialist

- First spaceflight, will use station robotic arm to move cargo from the shuttle to the station
- Age: 39, born in Boston, enjoys stamp collecting and traveling

Thomas Reiter

ESA astronaut, Mission Specialist

- Veteran of one spaceflight, will remain aboard the space station for several months
- Age: 47, born in Germany, enjoys fencing and playing guitar The STS-121 patch depicts the space shuttle docked with the International Space Station in the foreground, overlaying the astronaut symbol with three gold columns and a gold star. The background shows Earth at nighttime with a dawn breaking over the horizon.

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National Aeronautics and Space Administration

NASA Ames Research Center
Moffett Field, California, 94035

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