"Acceptable" risk level for shuttle launch

After nearly a year of safety tests and enhancements, the space shuttle *Discovery* is again ready for launch. NASA engineers have concentrated on reducing the risk of foam debris falling from the external fuel tank and introduced new systems to detect damage to the orbiter's heat shield

1 Protuberance air load (PAL) ramps: Two foam strips used to improve aerodynamics of tank had greatest risk of falling during lift-off. Mission will be first to fly without them

2 Ice/frost ramps: 34 foam wedges designed to prevent ice build-up on tank during ascent will remain unmodified, even though NASA accepts they need a redesign

3 Bipod Struts connecting orbiter to tank have improved design to reduce foam loss

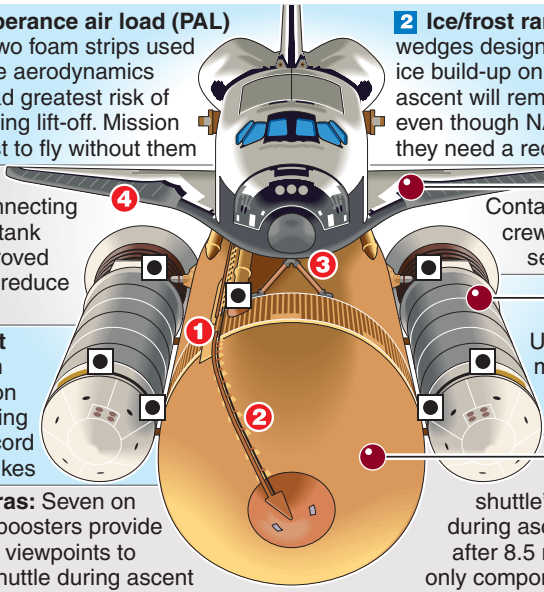
Orbiter Contains pressurised crew cabin for up to seven astronauts

Solid rocket boosters Used for first two minutes of flight, then jettisoned and recovered

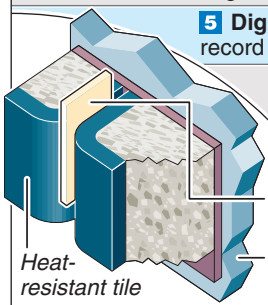
4 Impact detection Sensors on wing leading edges record debris strikes

External tank Feeds fuel to shuttle's main engines during ascent. Jettisoned after 8.5 minutes, tank is only component not reused

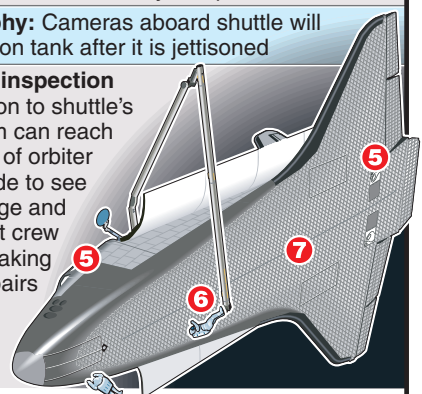
Cameras: Seven on tank and boosters provide additional viewpoints to monitor shuttle during ascent



5 Digital photography: Cameras aboard shuttle will record any foam loss on tank after it is jettisoned



6 In-flight inspection 15m extension to shuttle's robotic arm can reach any part of orbiter underside to see damage and assist crew in making repairs



7 Heat shield: Thousands of gap fillers between tiles have been replaced to prevent heat build-up on re-entry to Earth's atmosphere

Source: NASA