CST-100 Starliner Spacecraft
• Flight-proven systems with high-technology readiness level
• Firm configuration established
• Moving from design to production on multiple crew modules and service modules

United Launch Alliance Atlas V Rocket
• 73 successes and counting!
• Proven rocket significantly reduces system risk; unparalleled schedule assurance; 100% mission success
• Human-rating of Space Launch Complex 41 at Cape Canaveral Air Force Station nearing completion

Mission Operations
• Integrated with the world’s experts on mission control: NASA Flight Operations Directorate
• Crew engagement through plan, train and fly phases

Ground Processing Operations
• Commercial Crew and Cargo Processing Facility modernized at NASA’s Kennedy Space Center
• Lean production based on Boeing’s commercial approach
• Integration testing and quality processes based on space shuttle and International Space Station approaches
BUILDING: Crew modules and service modules in production at NASA’s Kennedy Space Center.

TESTING: Subsystem and system testing at Boeing and supplier facilities across the U.S.

TRAINING: Mission simulations and training taking place at NASA’s Johnson Space Center.

INTEGRATING: With NASA’s existing operational model for spacecraft visiting the International Space Station.
**SPACECRAFT INTEGRATED BUILD AND TEST**

**Structural Test Article**
- Modal survey; FEM validation
- Structures loading for critical load conditions; structural integrity
- Ordnance-actuated device shock levels; separation system performance

**Service Module Hot Fire Test Vehicle**
- Demonstrate integrated propulsion system performance and system dynamics
- Simulated propellant flow for all mission scenarios
- Fuel loading demonstration
- Hot fire testing to include all orbital maneuvers in space, including an abort

**Pad Abort Test Vehicle**
- Ground Verification Testing
- Demonstrate the abort system performance

**Orbital Flight Test Vehicle**
- Demonstrate complete orbital mission to International Space Station
- Processed for Post Certification Mission-1

**Crew Flight Test Vehicle**
- Electromagnetic compatibility
- Thermal vacuum and acoustic environment
- Demonstrate complete orbital mission to International Space Station with crew on board
- Processed for Post Certification Mission-2

**Three Flight Test Service Modules in Build**
LAUNCH VEHICLE AND INFRASTRUCTURE

- Major components for test flights and missions in production
- Crew Access Tower, Crew Access Arm and Emergency Egress System installed at launch site
- Design Certification Review coming up
TESTING

- Shock, loads and modal
- Wind tunnel
- Rescue and recovery
- Contingency water landing
- Land landing qualification
- Launch abort and reaction control system
- Parachute and deployment sequence
- Starliner docking system
- Autonomous docking and software
TRAINING

- Rehearsal simulations of all mission phases with NASA Flight Ops and Astronaut Corps
- Spacesuit production and testing
- Training system development, installation and implementation
- Paper and on-console simulations
FOCUS: Integrating with NASA as our flagship customer; detailed Verification and Certification process

FUTURE: Passenger flights to and from low-Earth orbit destinations, carrying international and corporate astronauts, scientists, researchers, educators and tourists
AVIATION

U.S. Post Office Owned and Operated Air Mail Services

1918 - 1926

Boeing B-1

Boeing Model 40

Boeing Government Contract for San Francisco to Chicago Mail Route

1925 - 1927

Boeing Model 40

Boeing 787-9

Start of Commercial Airline Industry

1929 - 1934

In first year, Boeing Air Transport carried 837,211 pounds of mail, 149,068 pounds of packages and 1,863 passengers

Commercial Airplane sales and airline services flourishing worldwide

Present

Kelly Act requires commercial contracting

In the next 24 hours, 3 million passengers will board 42,300 flights on Boeing jetliners
TIMELINE FOR COMMERCIALIZATION

SPACEFLIGHT

1981-2011
Government Owned and Operated Space Transportation System

1984, 1990
Laws direct NASA to pursue commercial options

2010-2011
Commercial Cargo Transportation Demo Flights

2012-Present
Commercial Resupply Services to ISS

Contracted in 2014
Now in Development
Commercial Crew Transportation Services to ISS
NASA CONTRACT: Design, build, test, train and fly the next crew transport vehicle for low-Earth orbit.

REQUIREMENTS: NASA's safety, performance and mission requirements are derived from 50+ years of human spaceflight experience and lessons learned. The CST-100 Starliner will meet or exceed all of the agency’s requirements.

FLIGHT MANIFEST: On contract for two test flights and six missions to the International Space Station.

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