



**N**orthrop Grumman is a principal member of the Lockheed Martin-led industry team that is developing and producing three variants for the F-35 Lightning II program. The F-35A is the conventional takeoff and landing (CTOL) variant, the F-35B is the short takeoff-vertical landing (STOVL) variant, and the F-35C is the carrier variant (CV).

Northrop Grumman plays a critical role in the development, demonstration and production of this multi-role fighter. In addition to producing the F-35 center fuselage, Northrop Grumman also designs and produces the aircraft's radar and other key avionics, including the Distributed Aperture System and communications, navigation, and identification subsystems; develops mission systems and mission-planning software; leads the team's development of pilot and maintenance training courseware; and manages the team's development and use of low-observable maintenance technologies.

The program's hallmarks — lethality, survivability, supportability and affordability — are achieved through the use of the most modern military aircraft technologies, state-of-the-art production facilities, and a high degree of commonality among the three variants. The team is using advanced manufacturing techniques to enable a unique, high-rate production program.

*THE VALUE OF PERFORMANCE.*  
**NORTHROP GRUMMAN**

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**F-35  
Lightning II**

*Joint Strike Fighter  
Program*

*THE VALUE OF PERFORMANCE.*  
**NORTHROP GRUMMAN**



## **F-35 Program Overview**

The F-35 Lightning II is a stealthy, supersonic, multi-role fighter designed to meet the requirements of the United States and allied defense forces worldwide for an affordable next-generation fighter. It will replace a wide range of aging fighter and strike aircraft currently in the inventories of the U.S. Air Force, Navy, Marine Corps and allied defense forces.

### **Center Fuselage**

Northrop Grumman designs and produces a major airframe segment for all three variants — the center fuselage. The center fuselage incorporates a diverter-less, serpentine, bifurcated inlet system, and forms a significant portion of the aircraft's internal weapons bay and internal fuel capacity. The aircraft's in-flight operating doors, including the weapons bay doors and door drive systems, are also produced by Northrop Grumman. The center fuselage edge alignment, coatings, and in-flight operating doors are essential elements contributing to the F-35's unique capabilities.

Northrop Grumman launched the F-35 Integrated Assembly Line (IAL) in Palmdale, Calif., in March 2011 and delivered its first center fuselage from the IAL to Lockheed Martin in March 2012. The IAL maximizes robotics and automation, providing additional capacity and assembly capability to achieve high rates of production, while meeting engineering tolerances not easily achieved manually. The IAL is one of the ways Northrop Grumman increases the program's affordability by reducing program costs and labor requirements.



### **Radar, DAS, Electronic Warfare**

The Northrop Grumman AN/APG-81 active electronically scanned array (AESA) fire control radar provides an unmatched capability that supports a full range of air-to-air and air-to-surface missions complemented by significant electronic warfare and intelligence, surveillance and reconnaissance functions. Already tested in operational exercises, the world's best fighter radar provides the F-35 pilot with precision, time-critical, all-weather targeting capability in the most stressing operational scenarios. The AN/APG-81 radar has successfully demonstrated effective, robust electronic protection against enemy jammers well ahead of scheduled operational testing, reducing programmatic risk and ensuring mission success.

The AN/AAQ-37 Distributed Aperture System (DAS), developed by Northrop Grumman, brings never-before-seen capabilities to the warfighter and is not available on any other aircraft. The DAS modes of situational awareness, infrared search and track, missile warning and navigation all operate simultaneously, providing F-35 pilots with a protective 360-degree sphere around the aircraft. The DAS detects and tracks aircraft and missiles in every direction while providing imagery to the helmet-mounted display and the panoramic cockpit display for day/night navigation.

In addition to designing and developing electronic warfare equipment and software for the aircraft's electronic warfare suite, the company manages the development and integration of the inertial navigation system, global positioning system, landing aid antennas and common components. The latter comprises the racks, power supplies, module kits and network interface units used in the development of all avionics subsystems.

### **Communications, Navigation and Identification Subsystems**

The Communications, Navigation and Identification (CNI) system is an advanced integrated avionics system that greatly enhances pilot effectiveness. CNI is built upon software-defined radio technology using reconfigurable radio frequency and digital processing hardware that can be dynamically programmed to perform multiple functions. The system arms the F-35 pilot with multiple-mission capabilities engineered for seamless transition from one mission phase to the next.

The CNI avionics suite includes advanced capabilities such as ultrahigh frequency/very high frequency voice and data, identification friend-or-foe, Link 16, joint precision and approach landing systems, and the cutting-edge Multifunction Advanced Data Link (MADL) for low-observable platforms.

### **Mission Systems and Vehicle Systems**

Approximately one-third of the F-35's mission systems software lines of code are produced by Northrop Grumman software engineers. This code includes capabilities for off-board communications, mission planning and execution, systems prognostic health management and weapons integration.

The mission systems team has responsibility for the design and procurement of the Inertial Navigation System, Global Position Systems, navigation antennae and key vehicle systems such as the arresting hook system, the fire suppression system and the weapons bay-door drive system.

### **Global Sustainment**

- **Pilot and maintenance training courseware**  
Northrop Grumman leads a team of domestic and international courseware suppliers in the development and sustainment of F-35 training courseware that addresses all aspects of pilot and unit-level maintenance training, including mission-planning system operations and maintainer use of portable maintenance aids.
- **Support Equipment**  
Northrop Grumman is a key member of the F-35 support equipment team that develops, designs and produces equipment and associated software required to support and maintain all three variants of the F-35 aircraft.
- **Supportable Low Observables**  
Northrop Grumman is designing surface treatment repair techniques and producing low-observable verification systems to allow customers to meet low-observable performance requirements in an operational environment, with significantly less maintenance time required than other low-observable aircraft.