F-35 LIGHTNING II

Team RamRod
Outline

- Introduction - Arlo Swanson
- History - James Bohn
- Technology -
  Hari Shrestha: Propulsion
  Daniel Ramirez: Stealth, systems, and weapons
- Future - Garret Wilbanks
- Economy - Tyler Barry
- Conclusion - Arlo Swanson
Introduction

http://www.youtube.com/watch?v=n6lK5gzuWf4&feature=player_embedded

1981- F117 is the first aircraft designed entirely around stealth capability and goes into production.

1997- B2 Spirit stealth bomber becomes active and is the first stealth aircraft to offer payloads consisting of air to surface standoff.

http://en.wikipedia.org/wiki/F117
 história

- 2005- F22 Raptor is introduced, creating the “stealth air superiority fighter class”

- 2006- First production F 35 leaves Lockheed Martin factory

- 2011- Three variants of F 35 are in production in Ft. Worth Tx, Including the F 35C, the Navy’s first stealth fighter

F-35 Propulsion systems are the most powerful turbofans in the world.

Two major engine variants for the F-35: one will power the CTOL and CV versions of the aircraft, while the other will power the STOVL version.

Made by Pratt & Whitney.

Utilizes common exhaust and Lift System systems.
Rolls Royce Lift System Engine Specification

- **Lift Fan:**
  - 20,000lbf (89kN) cold thrust
  - 2 stage counter rotating fan
  - Utilizes world leading hollow blisk technology

- **3 Bearing Swivel Module:**
  - Directs 18,000lbf (80kN) thrust from main engine
  - Rotates 95 degrees in 2.5 seconds
  - Reheat capable during conventional flight

- **Roll Posts:**
  - Direct 1,950lbf (8.7kN) bypass thrust from main engine
  - Hydraulically actuated nozzles during STOVL operations
  - Provide aircraft roll control and lateral stability
LM F-35/F136 STOVL Propulsion System

System Development & Demonstration (SDD)

Roll Nozzles (Bypass Flow) (RR)
Augmentor (GE)
STOVL 3-Bearing Swivel Duct (3BSD) (RR)
F136 Engine (GE 60% / RR 40%)
RR is Exclusive to GE on JSF Engine
Shaft Driven Lift Fan (RR)
Lift Fan Shaft (RR)

Engine Nozzle (in Vertical Thrust Position) (PW)

GE-RR F136 Propulsion System: More Than Just an Engine
Technology-Stealth

- Small cross section
  - Large vs. small surface area
- Materials
  - Fiber-mat
- Shape
  - Chines
  - System integration
    (i.e. weapons and fuel tanks)
- X and upper S bands
- Infrared and visual signature reduction
Technology-Systems

- Situational awareness
- AN/APG-81 AESA radar
- Electro-Optical Targeting system
- Passive infrared sensors
  - Missile warning system
  - Missile launch location
  - Spherical aircraft detection
  - Replace night vision goggles
- Synergy

http://en.wikipedia.org/wiki/Lockheed_Martin_F-35_Lightning_II
DAS Provides All Functions Simultaneously

Technology-Cockpit

- Speech recognition system
- Touch screens
- Helmet mounted display system
  - No HUD
  - Target tracking regardless of orientation
- Side stick controller
- Active Matrix Liquid Crystal Display image display
- Sensor fusion
- Binocular 40 degree by degree field-of-view
- Integrated day and night camera
- Ejection Safe to 600 knots equivalent air speed

Internal weapons bays vs. external hardpoints
  - Stealth capabilities
- GAU-22/A
  - 182 rounds internally
  - 220 rounds externally
  - Pod for electronic warfare equipment
- Solid state laser (2002)
- Next Generation Jammer

http://www.f-16.net/f-16_forum_viewtopic-t-12014.html
Different packages for different branches of military

- F-35A CTOL
- F-35B SVTOL
- F-35C CV
- Future packages
Future

- F-35 on the chopping block
- Future roles of the F-35
- Alternatives if the F-35 program is shut down
Economics

Current Jets

- **F-16 Fighting Falcon**
  - Year entered service: 1979
  - Number built: 2,200
  - Maximum Speed: 1,500 mph
  - Original cost: $18.8 million
  - Cost in today's dollars: $22.9 million

- **F-22 Raptor**
  - Year entered service: 2005
  - Number built: 62 (183 anticipated)
  - Maximum speed: more than 1,300 mph
  - Original cost: $133 million
  - Cost in today's dollars: $133 million
Economics

- **F-35**
  - Units to be built: 4500 (2443 domestic)
  - Cost in today’s dollars: $65 million

- **Domestic Impact**
  - 47 states involved
  - 900+ US companies
  - 5th Gen: $60 billion into economy over past 9 years
    - $2.1 B in Texas alone
    - $380 B expected
  - Largest single project job creator
    - 127,000 domestic jobs

Conclusion

- Three variants
  - F-35A, B, and C
  - Multirole capability
  - Different branch adaptability
- Replaces aging weapon systems
  - Replaces older fleets while improving aircraft capability
Any Questions?