



SWG Program Update

21 February 2013

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Program Executive Officer
F-35 Lightning II Program





F-35 Program Status

Bottom Line Up Front





- **F-35 Program on Realistic Baseline and Stable for past 2.5 years**
 - Slow but Steady progress being made
- **Program Executive Officer Assessment**
 - Affordability is #1 concern
 - Development: No more money, no more time
 - Production: Prices coming down slowly
 - Operations and Sustainment: MUST reduce life cycle costs
 - Schedule
 - 90% remaining in Production – Delivery Schedule is stable
 - 10% remaining in SDD
 - Moderate Confidence we will meet our 2015 capabilities (Block 2B)
 - Some risk to delivering 2018 capabilities (Block 3F)
 - NO showstoppers for known Technical Issues
 - Systems Engineering process/discipline producing better results
 - Technical Solutions in Work
- **Transparency, Accountability, Discipline**
- **Too Many Opinions, Not Enough Facts**



F-35 Program Status

(PEO Assessment)



- **Development**

- **SDD Cost:** \$55.2B (TY\$) **SDD Cost to Go:** \$5.8B **Schedule:** No Major Slips since 2011
- **Testing:** **Efficiency:**  **Effectiveness:** 
- **Software:** 
- **Other Technical Issues:** 

- **Production**

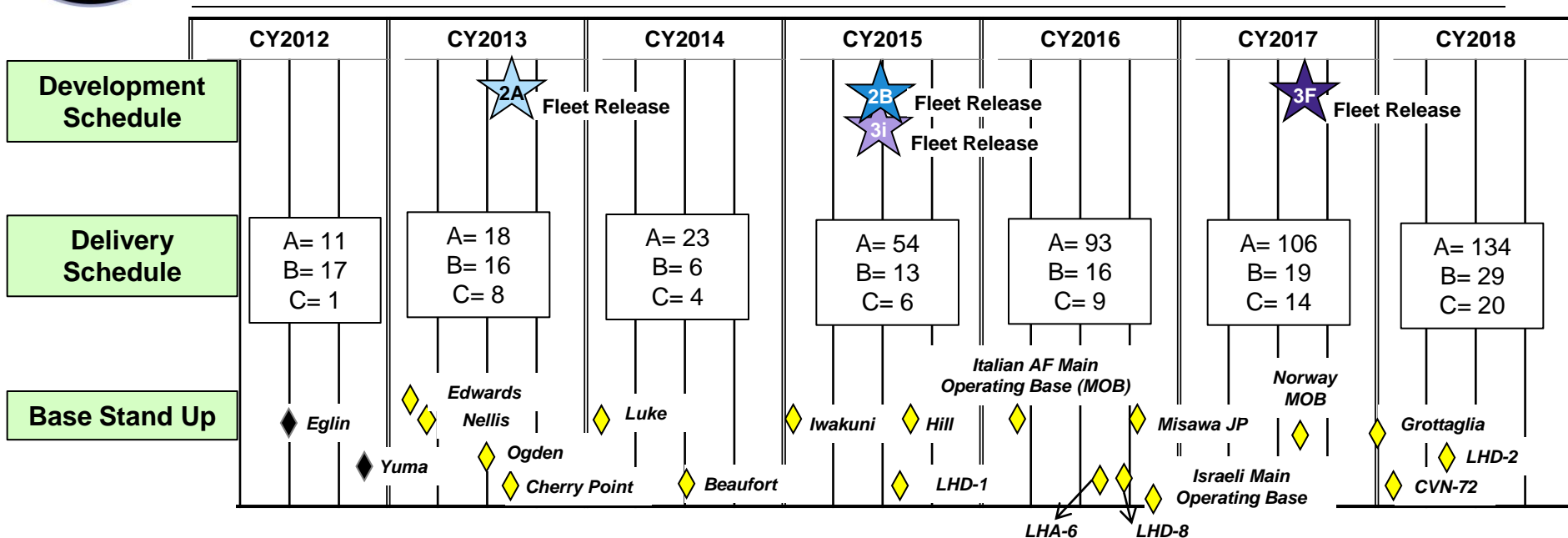
- **A/C Cost:** 4% Reduction from LRIP 4 to 5 **A/C Schedule:** Tracking to Post Strike Plan
- **A/C Quality:** Improving
- **A/C Concurrence:** Projected costs reduced ~30%; Actual costs well below projected
- **Engine Cost:** 4% (CTOVL/CV) / 18% (STOVL) Reduction from LRIP 4 to 5
- **Engine Schedule:** Average 60 days ahead of need
- **Engine Quality:** Quality escapes a concern

- **Sustainment**

- **O&S Costs** (20 yrs production, 30 yrs sustainment): 
2011 OSD Estimate: \$617B 2012 Program Office Estimate: \$549B (BY12\$)
- **A/C Availability:**  Readiness drivers identified with corrective actions
- **ALIS:** 1.0.3 delivered to Edwards, Eglin, Nellis, Yuma; still too many workarounds
- **Site Activations:** 4 sites to 17 sites in 5 years



F-35 Basics



F-35 Weapon System Capabilities:

Block 1 A/B

- Initial Simulated Air-to-Air
- Initial Simulated Air-to-Ground
- Air Refueling

Block 2 A/B

- Initial Warfighting Capability
- Initial Deployment
- Initial Weapons Employment

Block 3 I/F

- Exportability
- Full Warfighting Capability
- Internal/External Weapons

Block 4 A/B

- Follow-On-Development
- Added Weapons
- Improved Capability
- Enhanced Reliability & Maintainability

- **Development Schedule: .99 Earned Value "SPI" (Steady)**
- **Development Cost: .99 Earned Value "CPI" (Steady)**



Developmental Flight Test Efficiency

- **Facts About 2012:**

- 1,167 Test Flights, 18% more than planned
- 9,319 Test Points, 10% more than planned

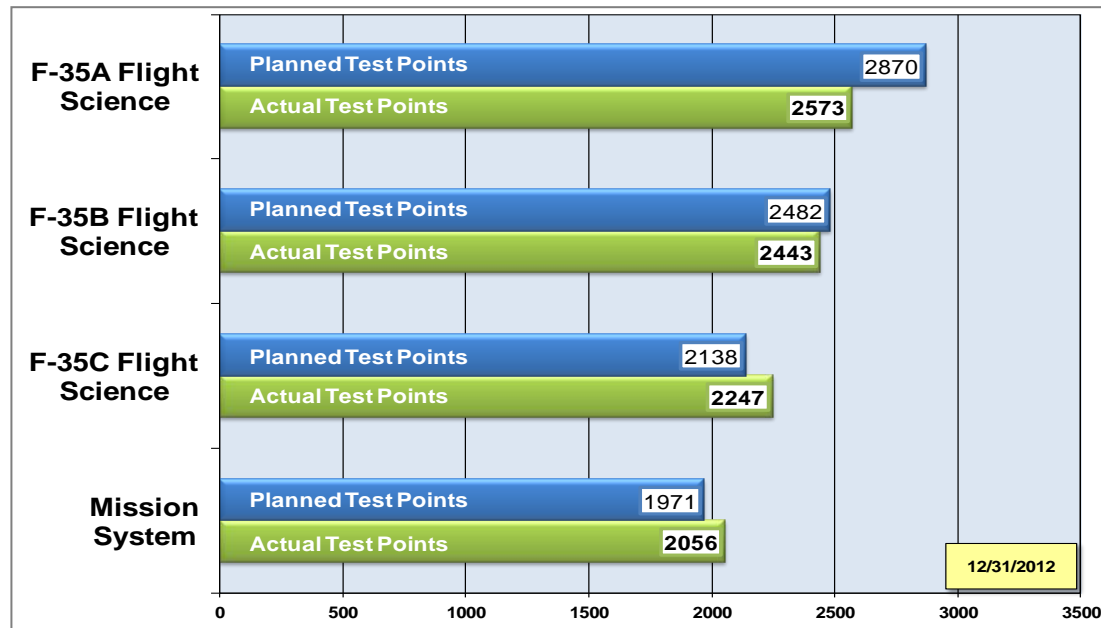
- **Successes:**

- High AoA including first Intentional Departure and Attained 75 deg AoA
- First Airborne Separation of GBU-12, GBU-31, AIM-120, Paveway IV training mode, AIM-120 sim launch against tracked target
- First Flight with Live Countermeasures
- 100% Complete Clean Wing Flutter
- First Night Refueling
- Air Start Testing Complete

- **...But, Issues:**

- Weapons Bay Flipper Door
- STOVL Operations Due to Aux Air Doors
- Spin Chute Modification Delays
- CTOL Air-Refueling Stop

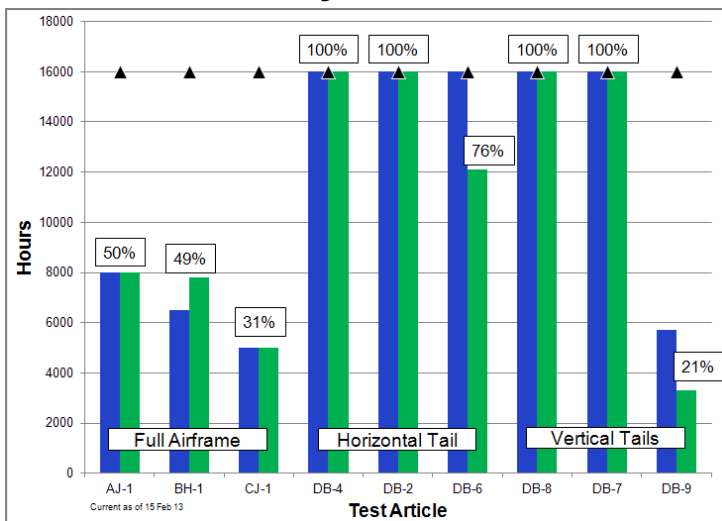
CY2012 Flight Test Efficiency





Developmental Flight Test Effectiveness

Durability Test Status



Hours	Major Finding	Corrective Action
1474 Hours	FS496 Bulkhead Cracking (B Model)	Redesign / Retrofit Cut In BF24
2117 Hours	Fwd Root Rib (A Model)	Redesign / Retrofit Cut In AF31
7000 Hours	FS472 Bulkhead Cracking (B Model)	Redesign / Retrofit Cut In LRIP7
5830 hours	Avionics Bay Floor Cracking (C Model)	Redesign / Retrofit Cut In TBD




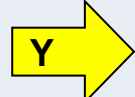
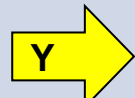


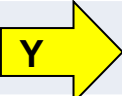
Flight Science

	F-35A Envelope	F-35B Envelope	F-35C Envelope
Blk 1B	500 KCAS / 0.9M 39k ft 18 deg AoA / 5.5g ✓	400 KCAS / 0.8M 39k ft 18 deg AoA / 4.5g ✓	N/A
Blk 2A	550 KCAS / 0.9M 40k ft 18 deg AoA / 5.5g ✓	450 KCAS / 0.9M 40k ft 18 deg AoA / 4.5g ✓	450 KCAS / 0.9M 40k ft 18 deg AoA / 4.5g ✓
Blk 2B AIM-120 GBU-12 GBU-31 / GBU-32	700 KCAS / 1.6M 40k ft 50 deg AoA / 7.0g Y	550 KCAS / 1.2M 40k ft 50 deg AoA / 5.5g G	550 KCAS / 1.2M 40k ft 50 deg AoA / 6.0g Y
Blk 3F AIM-9X SDB-I JSOW Gun Paveway IV	700 KCAS / 1.6M 50k ft 50 deg AoA / 9.0g	630 KCAS / 1.6M 50k ft 50 deg AoA / 7.0g	700 KCAS / 1.6M 50k ft 50 deg AoA / 7.5g



F-35 Technical Issues

As of 14 Feb 13

Issue	Key Accomplishments	Next Key Milestone	Status / Trend
BK-1 Fuedraulic Line Failure	<ul style="list-style-type: none"> All F-35B cleared to fly after mod Flights resumed on 14 Feb 	Return to production effort ongoing	
Gen II Helmet (Jitter, Green Glow, DAS, Acuity, Schedule, Export)	<ul style="list-style-type: none"> 19 of 38 Test Flights Complete Green Glow and DAS Latency DONE DoD/Service Review of Suitability 6 March 	CDR: 16 Apr 13	
F-35C Arresting Hook (Prob of Engagem't, Loads, Landing Spot - SW)	<ul style="list-style-type: none"> Redesign Ongoing Ground Test at Lakehurst 4Q2013 Carrier Qualification 3Q2014 	AS Block 3 CDR: 30 April 13	
Software (Delivery Timeline, Management of Capability Content)	<ul style="list-style-type: none"> New systems engineering rigor to manage SW build Block 2B Mission Systems SW Build Plan developed 	AS Block 3 CDR: 30 April 13	
ALIS Maturity (Unreliable health management, immature ALIS software)	<ul style="list-style-type: none"> New systems engineering rigor Incremental software fixes End-to-End Testing 	AS Block 3 CDR: 30 April 13	
Lightning Protection (Can't operate near thunderstorms)	<ul style="list-style-type: none"> Conducted Pre-CDR TIM, 23-24 Jan 13 	CDR: 26-28 Feb 13	
F-35B STOVL Ops (Clear fleet for vertical takeoff/landing)	<ul style="list-style-type: none"> BF-19 mod finished FRR completed: 24 Jan 13 	Interim Flight Clearance with NAVAIR Leadership	
Fuel Dump (Airframe wetting)	<ul style="list-style-type: none"> Flight test: trade study design solution review 	Design downselect: Mar 2013	

Acronyms:: SW: software; CDR: critical design review; TIM: technical interchange meeting; FRR: flight readiness review

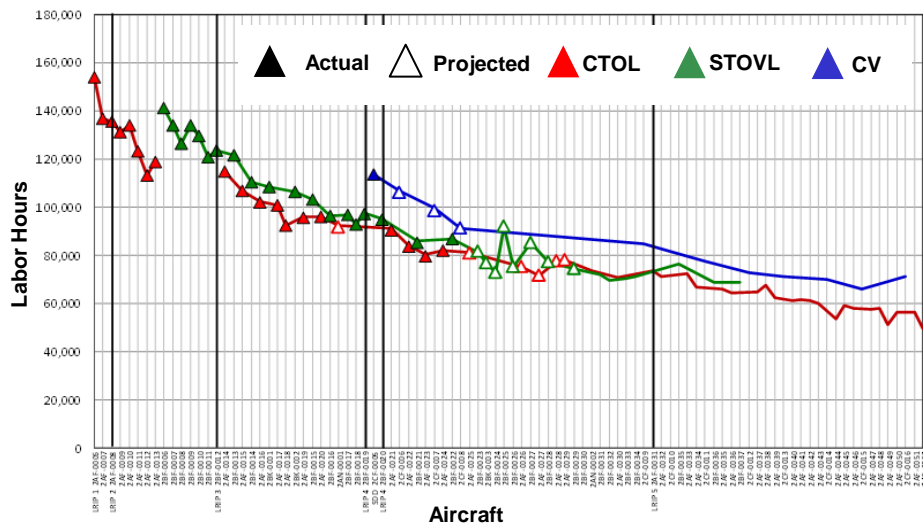
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.



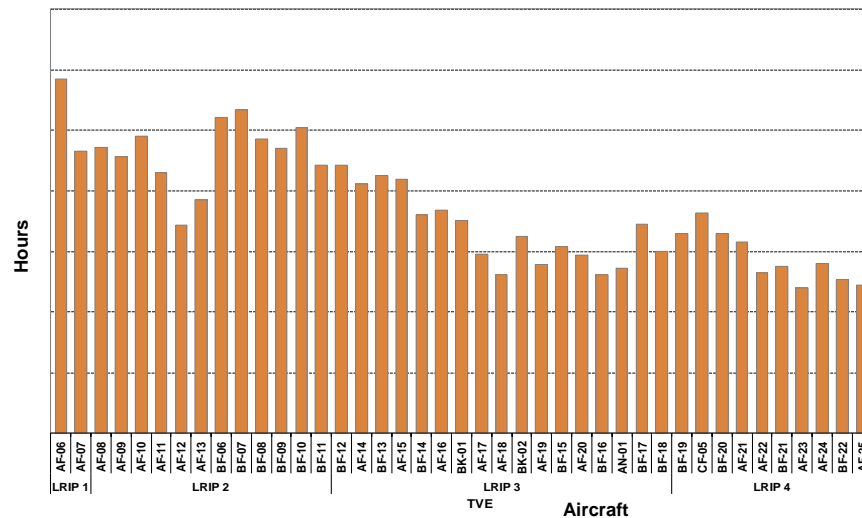
F-35 Production Quality

(Thru December 2012)

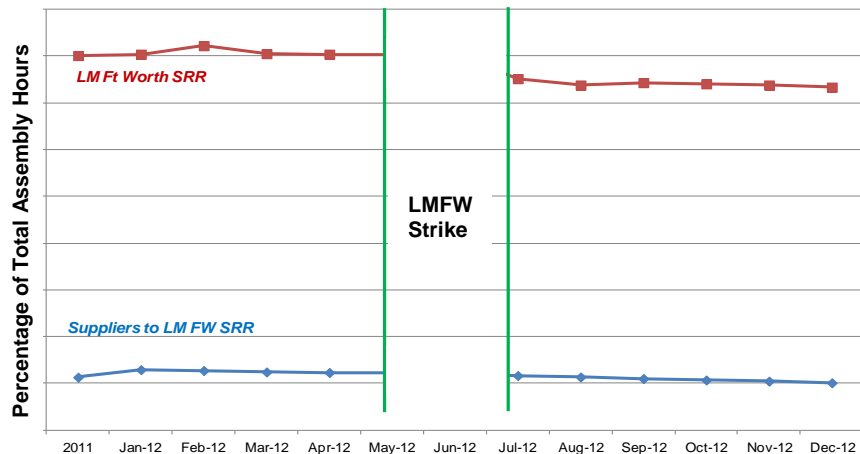
F-35 LM touch Labor Hours



Hours Expended On Quality Defects

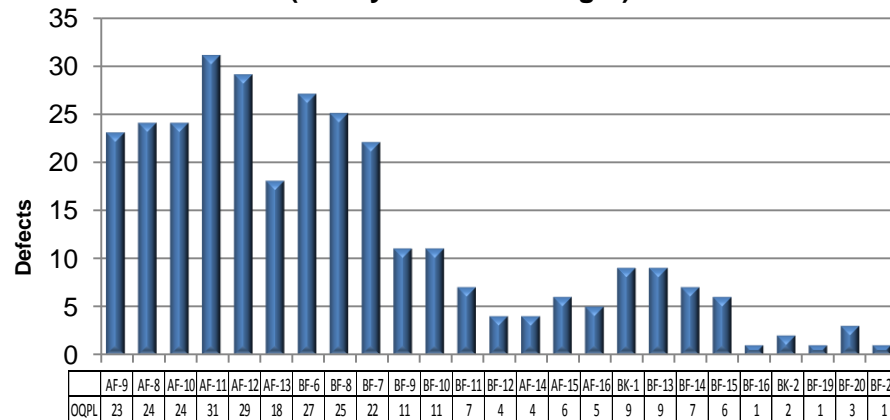


Scrap, Rework, Repair Hours



Delivered Aircraft Quality

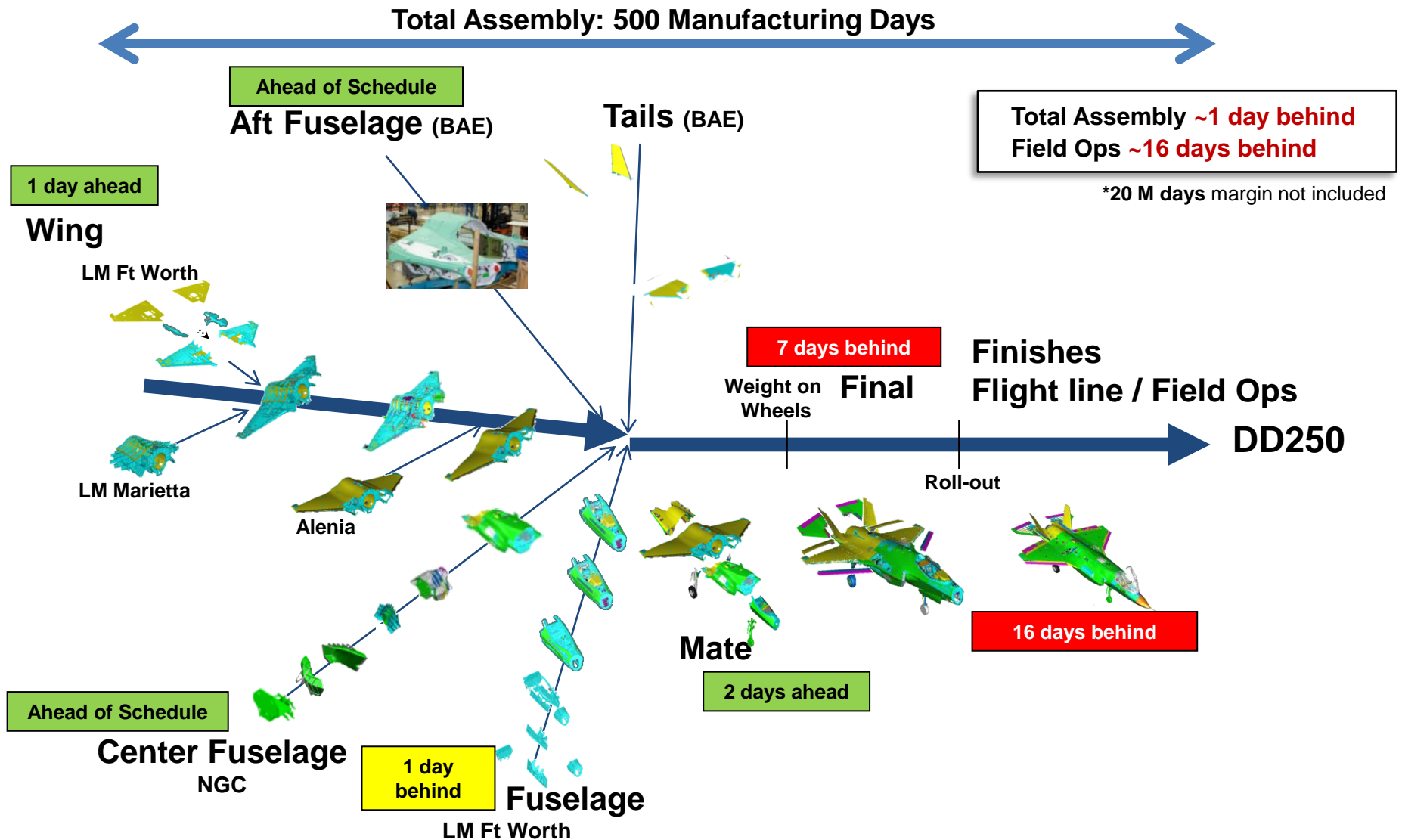
(60 days after First Flight)





F-35 Production Line Status

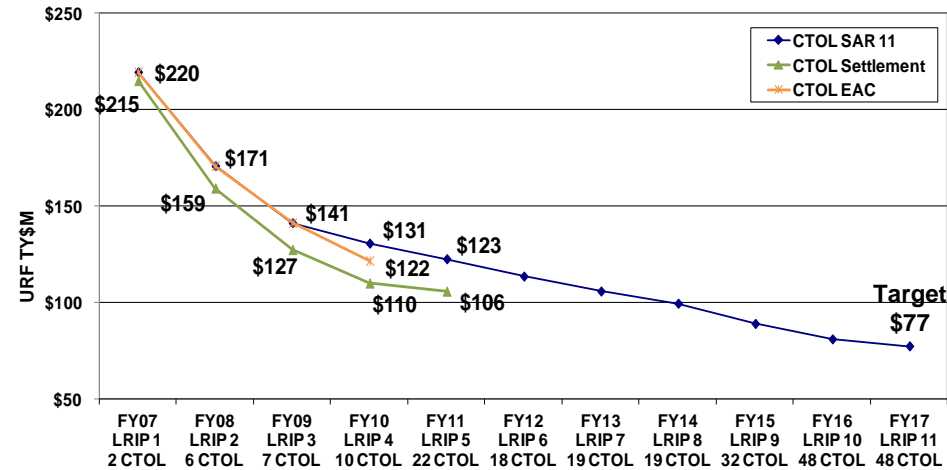
(As of 14 February 2013)



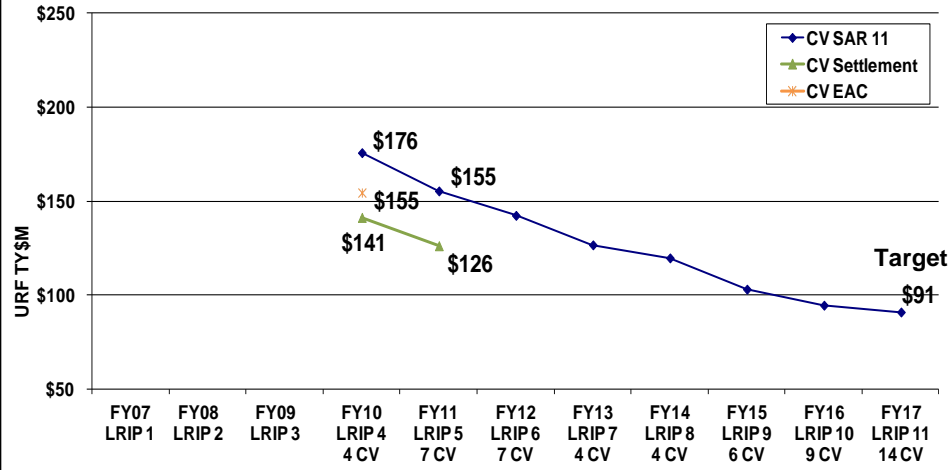


Airframe Production Costs

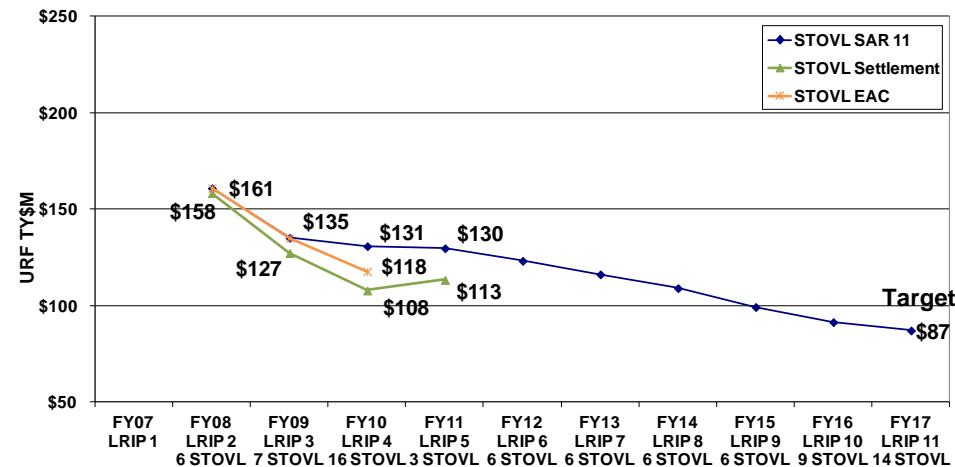
CTOL



CV



STOVL



Cost Performance

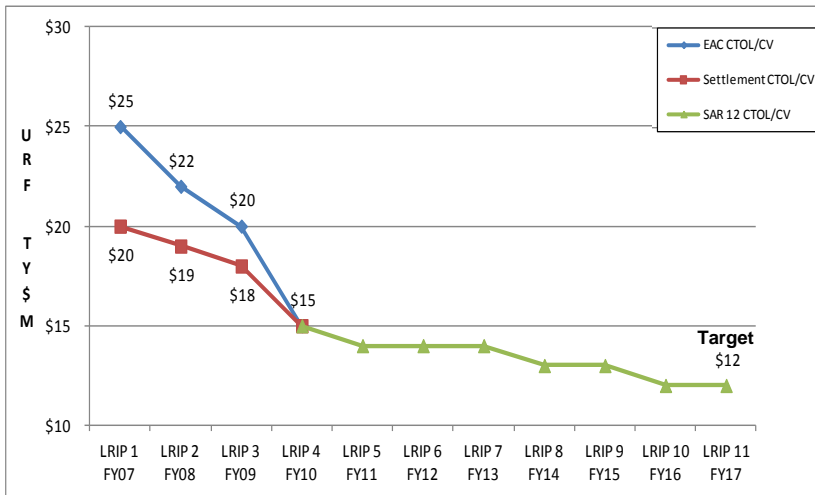
Contract	Increase Over Target cost
F-35 LRIP 1 (Cost Plus)	11.8%
F-35 LRIP 2 (Cost Plus)	17.2%
F-35 LRIP 3 (Cost Plus)	22.3%
F-35 LRIP 4 (FPIF)	8.7% (50/50)
F-35 LRIP 5 (FPIF)	45/55 over target share ratio
F-35 LRIP 6 (FPIF)	0/100 over target share ratio

- Month-end December 2012 CPR
- Production Basic Build Effort Only

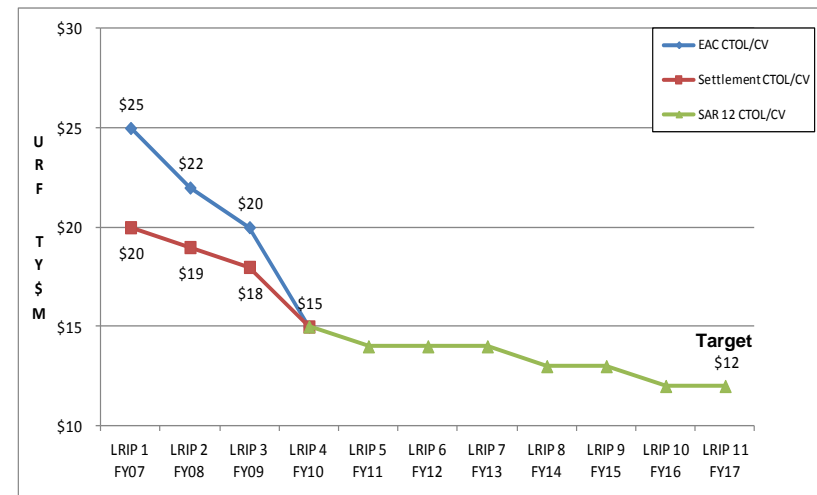


Engine Production Costs

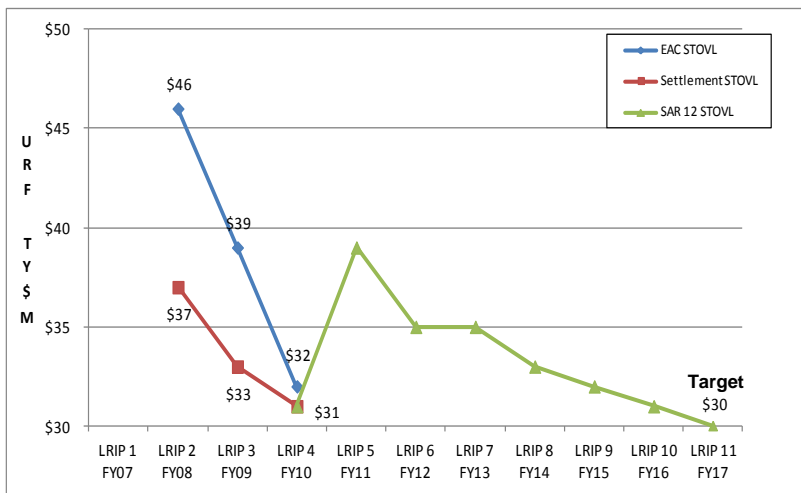
CTOL



CV



STOVL



Cost Performance

Contract	Increase Over Target cost
F135 LRIP 1 (Cost Plus)	4%
F135 LRIP 2 (Cost Plus)	13%
F135 LRIP 3 (Cost Plus)	11%
F135 LRIP 4 (FPIF)	3% (50/50)
F135 LRIP 5 (FPIF)	0/100 over target share ratio
F135 LRIP 6 (FPIF)	0/100 over target share ratio

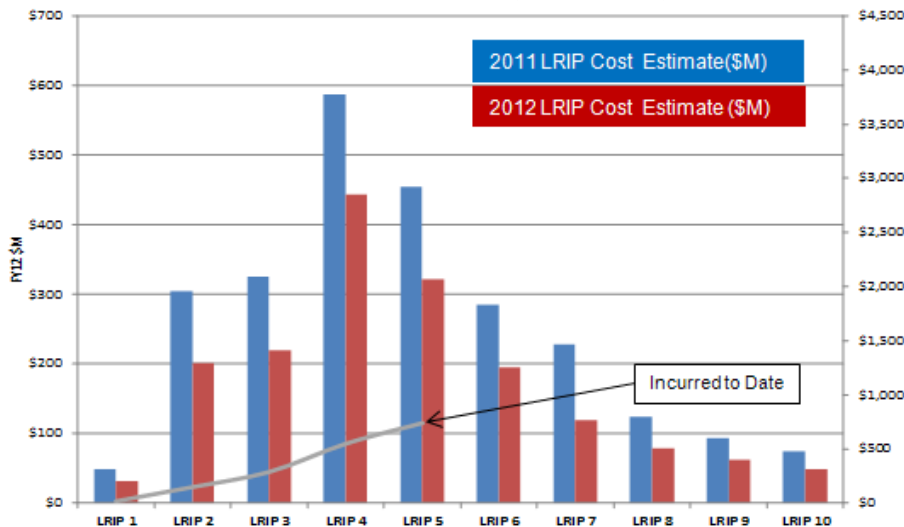
- Month-end December 2012 CPR, with JPO VACs (\$ M)
- Production Effort Only



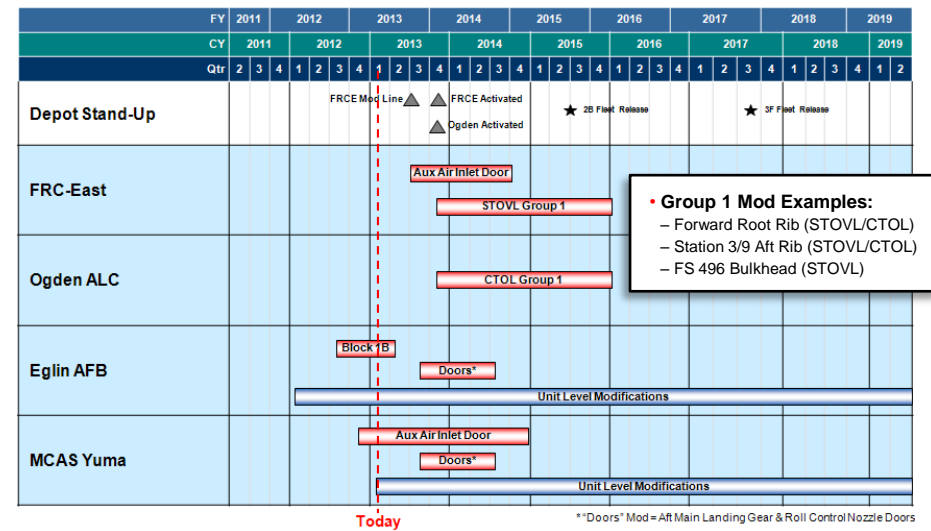
Concurrency

- **Concurrency is defined as the overlap of the development, test, production, fielding, operations and sustainment phases of an acquisition program**
- **Concurrency introduces risk of discoveries during production – requiring retrofit of delivered a/c**
 - Fixes rolled into Production line – Timelines decreasing (18 mos to 13 mos)
 - Retrofit aircraft already produced – requires modifications (Mod plan created and regularly updated)
 - Lockheed Martin sharing in Concurrency costs (LRIP 5 and beyond)
- **Concurrency Changes are identified during Flight Test, Qualification Test, Ground Test**

Projected Concurrency Cost by LRIP Lot



High-Level Mod Schedule



Increased Discipline in Estimating & Controlling Concurrency Costs



F-35 Sustainment

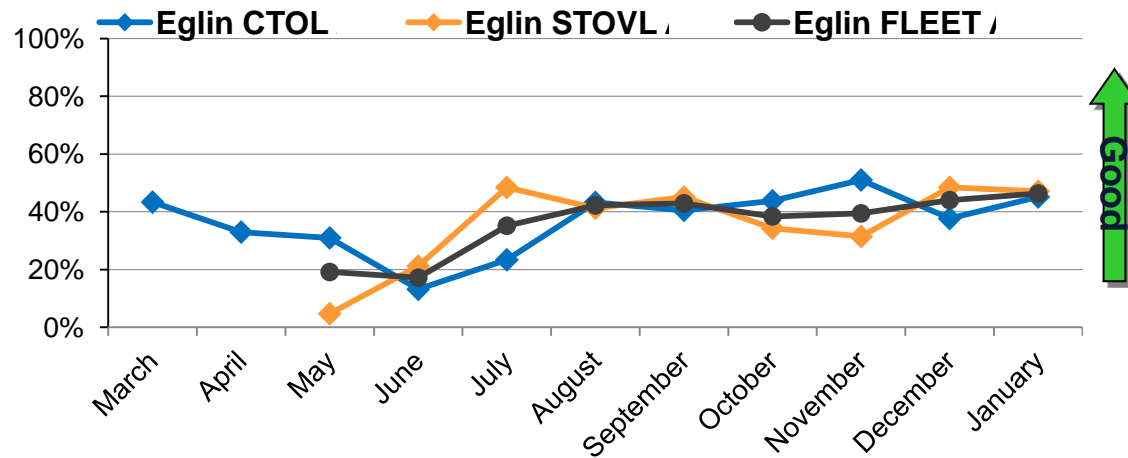
Metric	Requirement By Variant (CTOL/STOVL/CV)	Current Actual By Variant (CTOL/STOVL/CV)	Status Against the Plan By Variant (CTOL/STOVL/CV)
Reliability & Maintainability			
MFHBF _{DC} (Airframe)	(6.0/4.0/4.0)	(1.66/1.44/1.53)	↑ → →
MFHBF _{DC} (Engine)	(290/220/250)	(45.1/21.0/22.7)	
Prognostic / Health Monitoring			
Fault Detection Rate (%)	98	79.80	↑
Electronic Fault Isolation (%)	90	70.00	↑
False Alarms (MFHBFA)	50	.45	↑
Mean Downtime (Supply and Maint)			
Maintenance Man-Hours / Flight Hour Unsch. (MMH/FH(U))	(6.0/6.0/6.0)	(6.10/4.09/3.77)	↑ ↑ ↑
Elapsed Maintenance Time (MTTR)	(2.5/3.0/2.5)	(12.97/11.97/5.21)	↓ ↓ →

MFHBF_{DC} = Maintenance flight hours between failure

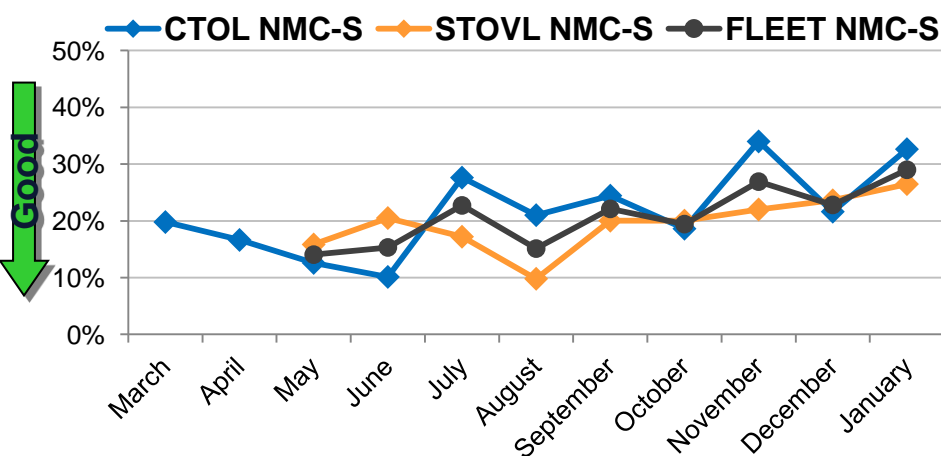


F-35 Sustainment

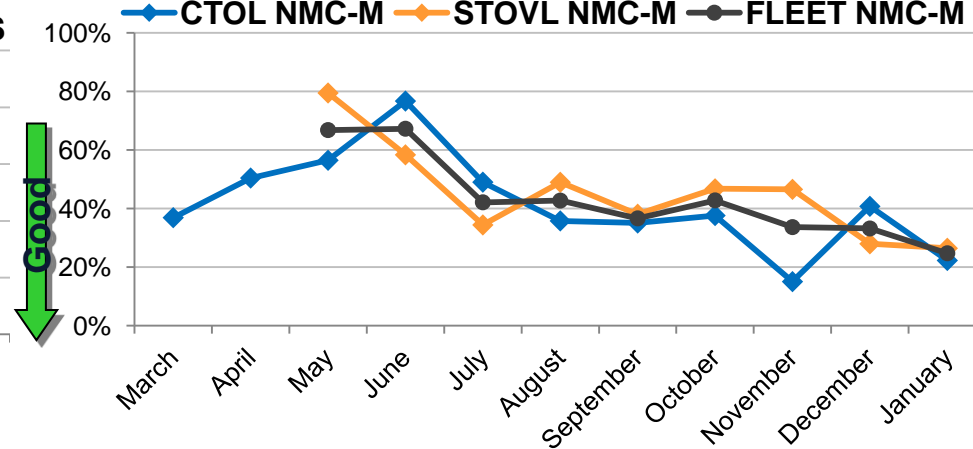
Air Vehicle Availability



Non-Mission Capable - Supply

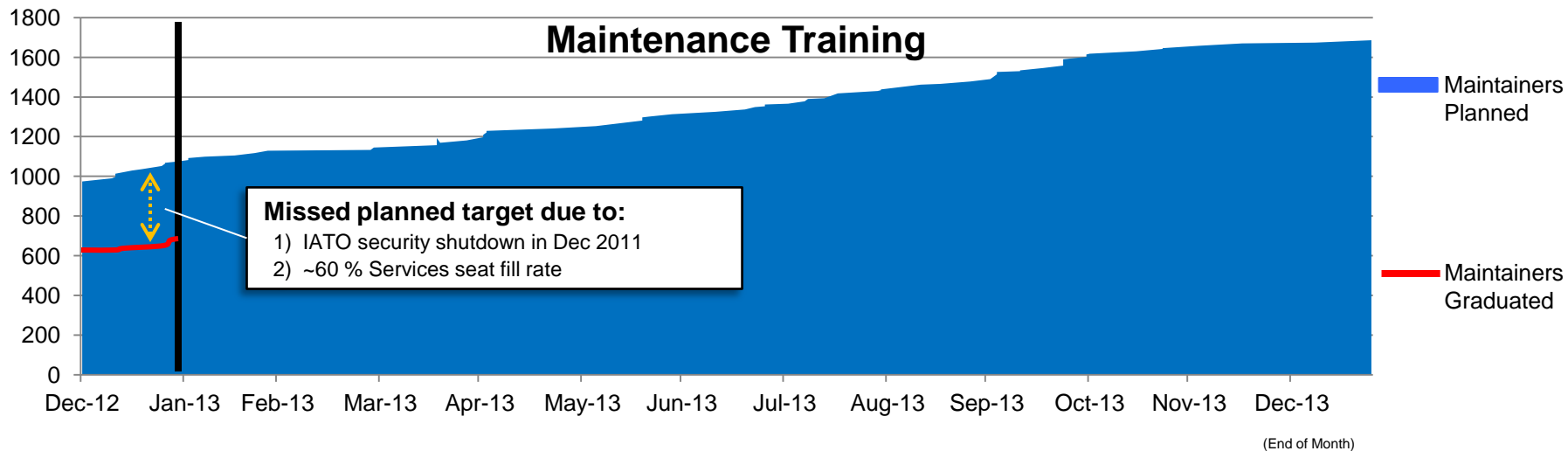
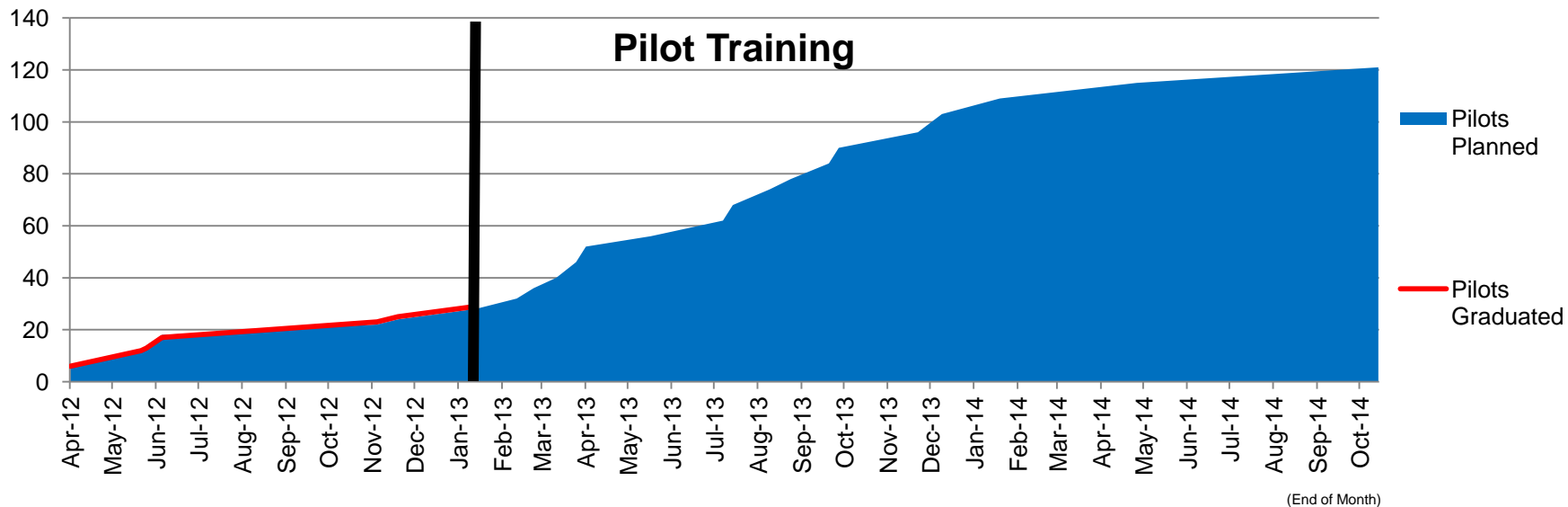


Non-Mission Capable - Maintenance





F-35 Operational Training ATC Student Throughput





F-35 Sustainment Strategy

- **F-35 Program Office will be Product Support Manager**
- **Product Support Integrator – Not Yet Determined**
 - LM and P&W have not earned right yet
- **Inject Competition where Feasible – Industry Day Results**
 - Support Equipment
 - Global Supply Chain
 - ALIS Administration
 - Training Center Operations
- **Improve Reliability and Maintainability of Weapon System**
 - Repair Contracts
 - Robust R&M Team
 - Deep Dive of top 20 Air Vehicle Depot Level Reparable (AVDLR) Costs
 - R&M Sensitivity analysis of top 50 AVDLR
- **Cost per Flying Hour Estimating**
- **ALIS Improvements**



F-35 PEO Planning Priorities

Year Long Continuing Resolution/Sequestration

- **Preserve System Design and Development to the maximum extent possible**
- **Keep Initial Operational Capability Options open with Block 2B**
- **Wholeness: Support and sustain all delivered aircraft**
- **Preserve efficiencies in production to the maximum extent possible.**
 - Reductions will decrease LRIP 7 quantities, increasing unit recurring flyaway cost
- **Maintain production capacity to the maximum extent possible.**
 - Reductions will decrease investments in tooling, redesigns for obsolete parts, and cost reduction initiatives



Partner Challenges

- **Cost Visibility**
 - JPO directing LM/PW to adjust Cost Reporting
- **Reprogramming Labs**
 - Partner/FMS Reprogramming Labs late to need; working to recover schedule
- **Airworthiness Requirements**
 - Single Airworthiness Process / Data for all Partners
 - Partner unique needs accommodated (funded) on a case-by-case basis
- **Transition to pooled training (2013-2014)**
 - Pooling Implementation Agreements and Contract signatures pending
- **Long-Term Training and infrastructure for CONUS-based international training and basing**
 - Working with Partners on requests for long-term support and U.S. military construction projects



Summary

- **Program Making Steady Progress**
 - Realistic Plan
 - Driving Stability into the Program
 - Schedule/Capabilities Holding Steady
- **Affordability is Critical for US and Partners**
- **Technical Issues are being worked**
- **New Culture for Industry, Program Office, DoD Enterprise**
 - Look Forward, Not Back
 - Transparency, Accountability, Discipline
 - Too many opinions, not enough facts
- **F-35 Program MUST deliver on its Promises**
 - Hold ME accountable



Questions?