

AF Smart Operations 21

Air Combat Command

E-8 ISO PROCESS

17-21 Nov 2007

Ken Hathaway, MSgt, 116MXS



This Briefing is:
UNCLASSIFIED



Overview

- **Team Composition**
- **Customer, Goals, and Scope**
- **Current Value Stream Map**
- **Future State Concepts**
- **Current/Future State Measures**
- **Anticipated Improvements**
- **Implementation Plan**



E-8 ISO Team

- **Team Lead**
 - **MSgt Ken Hathaway (116 MXS/ISO)**
- **Team Members**
 - **Maj Brian McHenry (116 MXS/CD)**
 - **1Lt Julian Thomas (116 MXS/Flight Commander)**
 - **CMSgt Rick Patterson (116 MXS/Supervision)**
 - **SMSgt Gary Keltner (116 AMXS/APG)**
 - **MSgt David Armour (116 MXS/ISO)**
 - **MSgt Chris Carbajal (116 MXS/Jets)**
 - **MSgt Owen Miller (116 MXS/MXGI)**
 - **MSgt Dave Jones (116 MXS/E&E)**
 - **TSgt Rich Wallace (116 MXS/ISO)**
 - **TSgt Andre Barreto (116 MXS/ISO)**
 - **TSgt Chris Cheek (116 MXS/ISO)**
 - **TSgt Jeff Hertog (116 AMXS/IFC)**
 - **TSgt Stephen Stidfole (116 MOS/MOC)**





E-8 ISO Team

▪ Team Members

- TSgt Lisa Williams (116 MOS/PS&D)
- TSgt Robert Baker (116 MXS/Sheetmetal)
- TSgt Shaun Oneill (116 AMXS/Union Rep)
- TSgt Burr Ciprich (116 AMXS/SR)
- TSgt Thomas Vasta (116 MXS/Fuels)
- TSgt Marc DiLoreto (116 AMXS/APG)
- SSgt Richard Routh (116 MXG/Hydro)
- SSgt John Rumbaugh (116 MXS/AR)
- SSgt Latasha Thomas (116 LRS/Supply)
- SSgt Fernando Duran (116 MXS/Jets)
- SSgt Ryan Edwards (116 AMXS/Com Nav)
- SSgt Amanda Owens (116 MXS/E&E)
- SrA Matthew Harris (116 MOS/Analysis)





E-8 ISO Team

▪ Facilitators

- Lt Col Matthew Cox, ACC/A4
- Mr. Jeff Combs, ACC/A4
- SMSgt Anthony Tomczak, 116 MXG / QA
- MSgt John Ace, ACC/A4Y



E-8 ISO Team





Customer, Scope, Goals

- **Customer: AMXS / Ops**

- **Scope: Evaluate the ISO process from the last flight before ISO until the first flight after ISO including scheduling, supply function, MOCC and scheduling of maintenance & AC sorties.**
 - **ISO Critical Value Stream Analysis**
 - **Last flight before ISO to first flight after ISO**



Customer, Scope, Goals

- **Goals:**
 - **Accomplish ISO in 14 +/- 2 calendar days fly-to-fly with the same or better quality product as at present as measured by number of code 1,2 and 3 sorties for the first 3 sorties after ISO, and by Ops mission effectiveness rates for the first 3 sorties after ISO.**



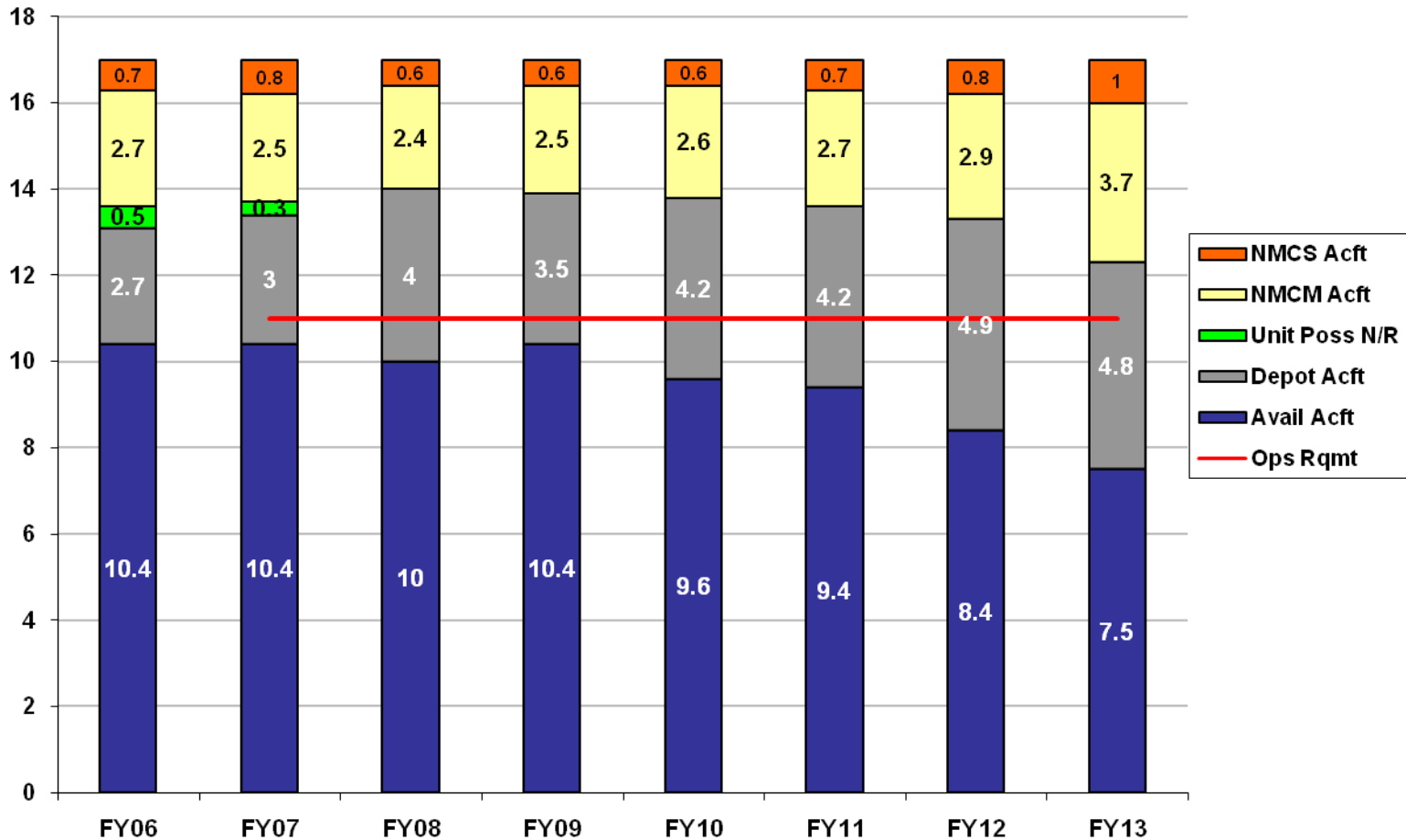
Current State - Processes

- **Major challenges/opportunities:**
- **The E-8 ISO has consistently been the top TM and TS driver. While M, TM, and TS rates all trending in the right direction, AA has a slight negative trend, and is not projected to meet the ops requirement according to HQ ACC and AFMC aircraft availability projections. By as early as 2010, E-8 aircraft availability will diminish significantly to -1 aircraft even after AFMC AA improvement initiatives. Over the past year, the numbers of sorties per month have been increasing both at home station and FOL.**
- **By decreasing the time in ISO between last flight before ISO to first flight after ISO, a potential aircraft availability improvement of as much as .25 may be realized.**



E-8 AAIP

- AA will decrease thru FY13 due to re-engining and DMS



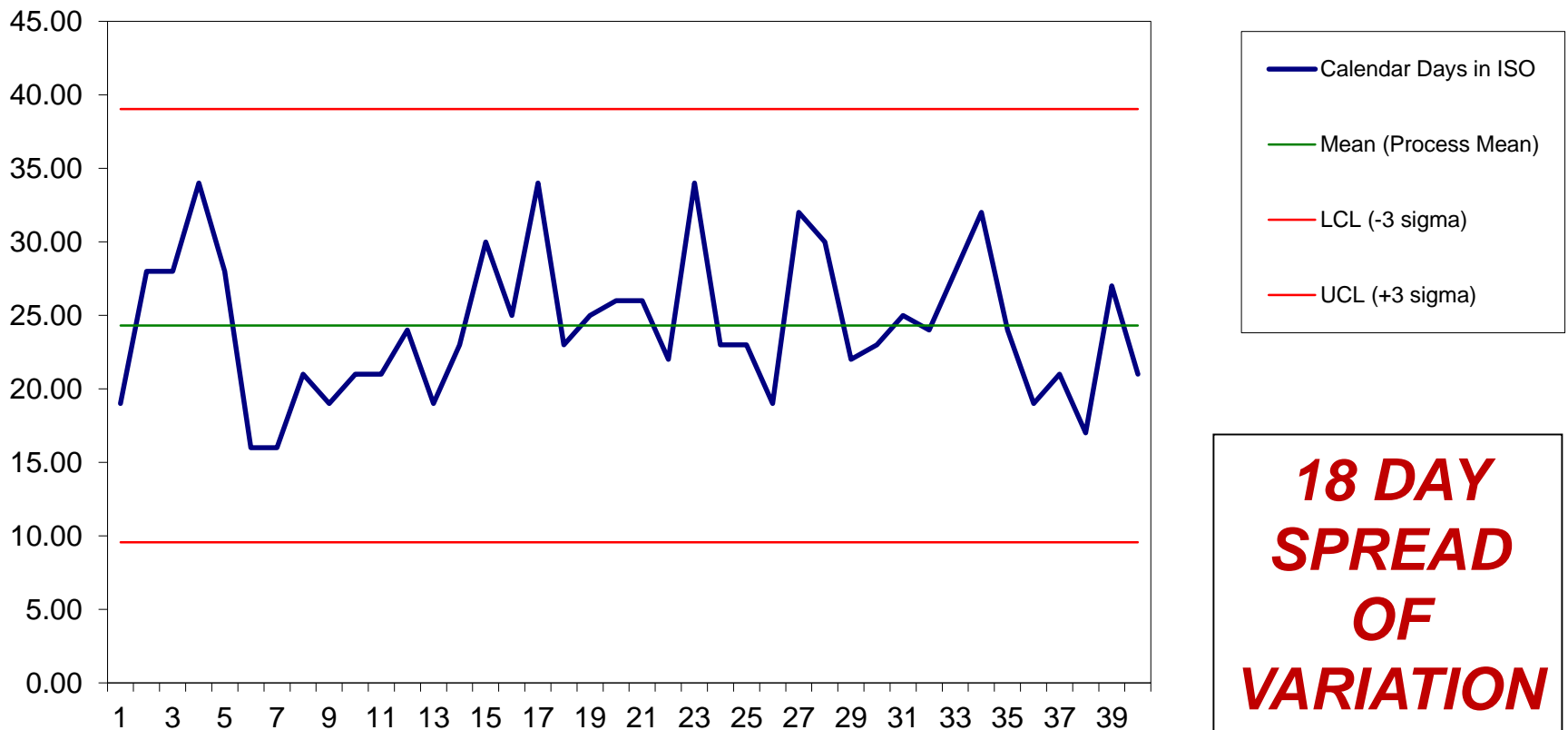
Total Aircraft Inventory

17	17	17	17	17	17	17	17
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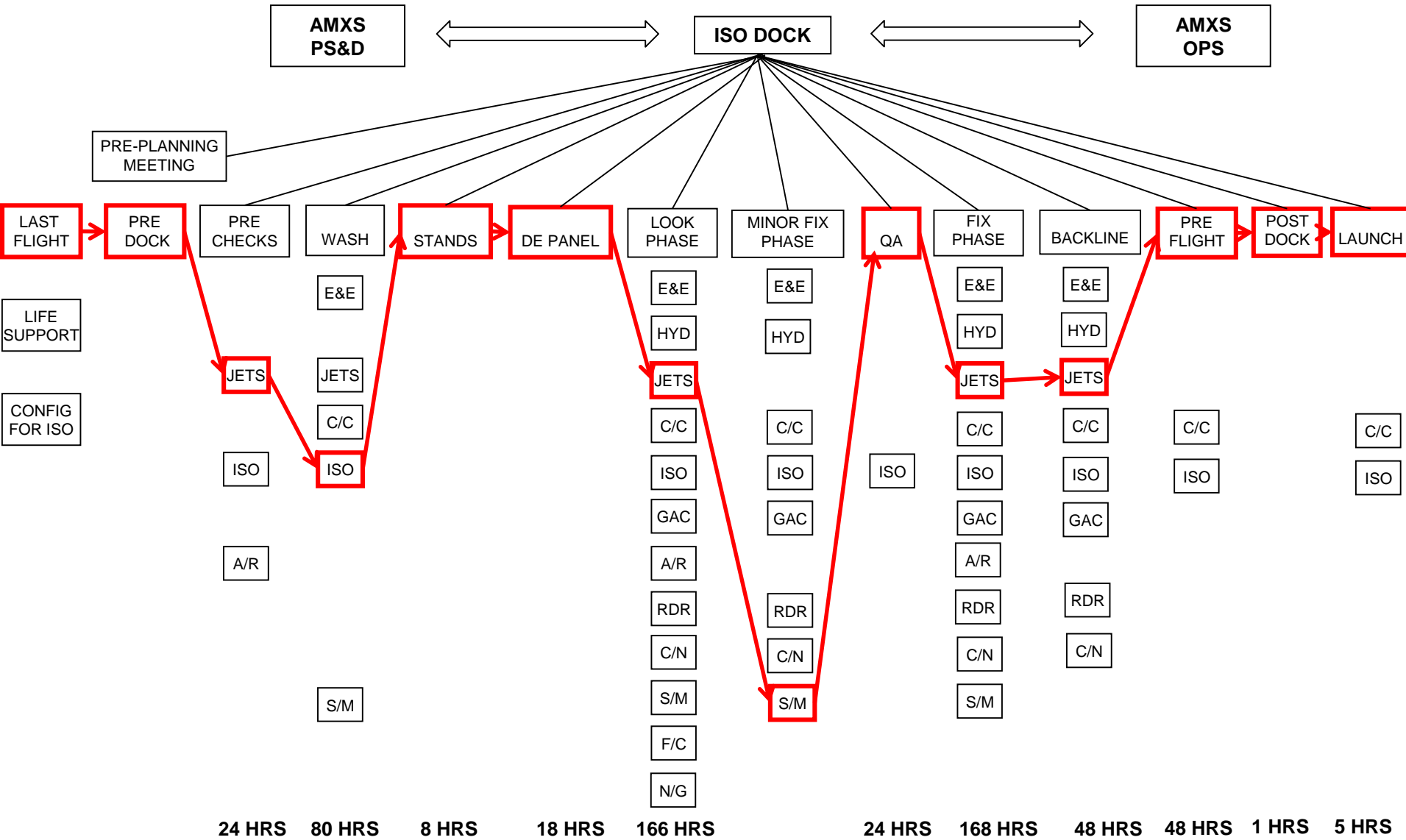
ISO Calendar Days - Variation

ISO Calendar Days - Process Performance Variation



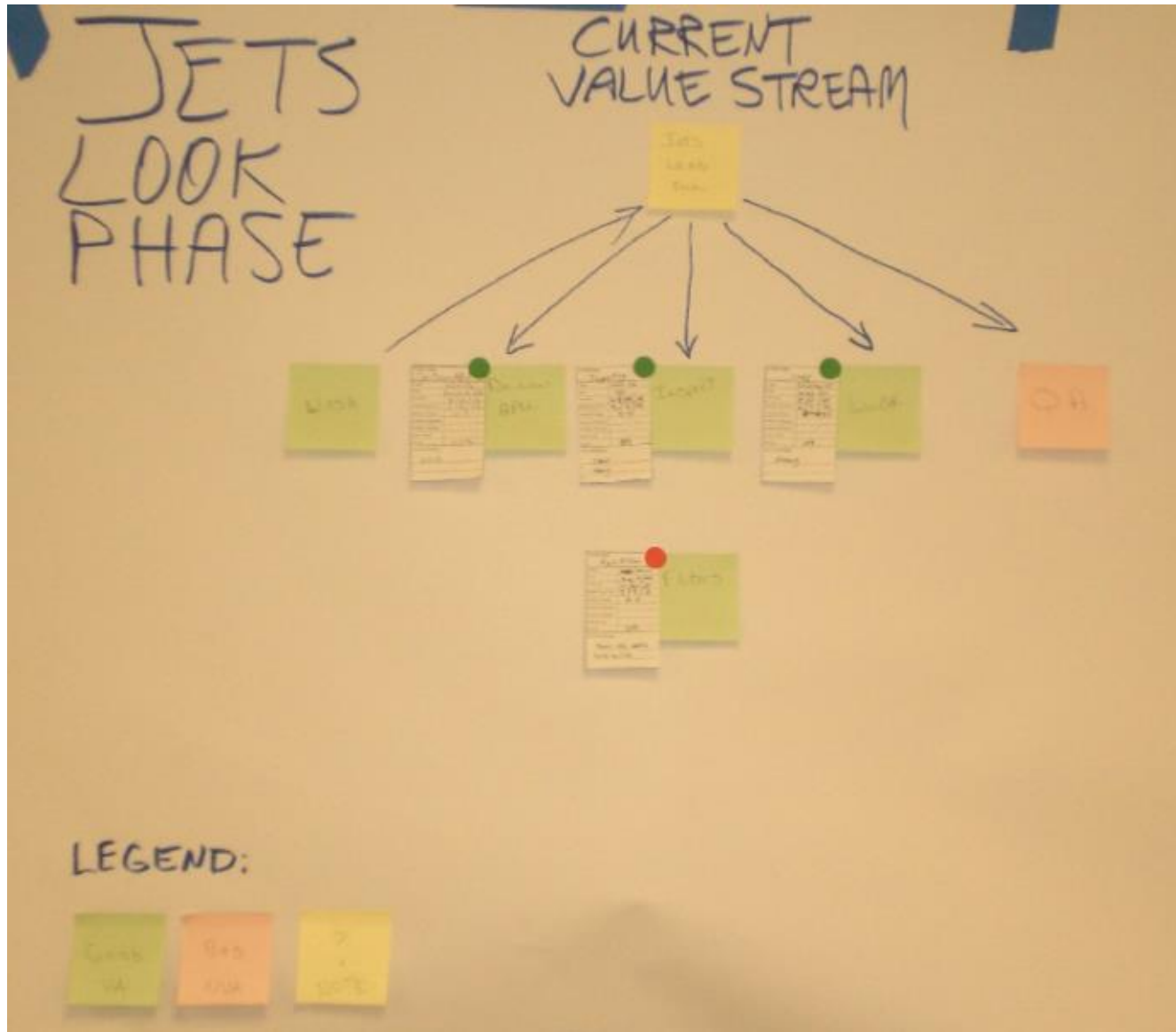


Critical Value Stream





Current Value Stream Map (ISO Process – Jets Only)





Top 10 Sources of Process Variation in Flow Time

<i>Process Step</i>	<i>Shop</i>	<i>Trigger</i>	<i>Done</i>	<i>Flow Time - Best</i>	<i>Flow Time - Normal</i>	<i>Flow Time - Worse</i>	<i>Flow Time - Variation</i>	<i>Touch - Best</i>	<i>Touch - Normal</i>	<i>Touch - Worse</i>	<i>Touch Time - Variation</i>	<i>Number People</i>	<i>% Yield</i>
Last Flight		Last Flight	Pre Dock	24	72	386	362	0	0	0	0	0	100
Fix Phase	A/R	ISO Dock Chief	CAMS C/W	0	100	336	336	0	96	320	320	9	95
Pre-Flight	ISO	Backline C/W	Pre-flight C/W	24	48	240	216	6	8	10	4	6	90
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	112	12	24	72	60	3	50
Fix Phase	Radar	ISO Dock Chief	Job C/W	10	24	96	86	8	20	84	76	4-8	85
Look Phase	Fuels	ISO Dock Chief	Workcards C/W	1	24	72	71	1	2	3	2	3	100
Look Phase	E/E	ISO Dock Chief	Work Cards C/W	24	36	72	48	12	17	20	8	9	70
Minor Fix Phase	E/E	Documentation	CAMS C/W	24	48	72	48	6	8	10	4	9	80
Fix Phase	E/E	ISO Dock Chief	CAMS C/W	72	96	120	48	12	16	20	8	9	70
Fix Phase	Hydro	ISO Dock Chief	Leak/Ops check C/W	24	48	72	48	4	8	12	8	2	90



Top 10 Flow Stoppers Causing Process Variation in Flow Time

<i>Process Step</i>	<i>Shop</i>	<i>Flow Stopper - 1</i>	<i>Flow Stopper - 2</i>	<i>Flow Stopper - 3</i>
Last Flight		Acft Schedule	Avail Personnel	
Fix Phase	A/R	Parts from Supply	Parts being Repaired	Untrained People
Pre-Flight	ISO	Support Equip	Ops Avail / Weather	Acft Ready
Last Flight	Crew Chiefs	Flying Schedule	Manning	Equip Failure
Fix Phase	Radar	Personnel	A/C Avail	Flt Line Mx
Look Phase	Fuels	Fuel Config	Avail Personnel	A/C equipment failure
Look Phase	E/E	Avail Personnel	Access to Acft	Parts Avail
Minor Fix Phase	E/E	Avail Personnel	Access to Acft	Parts Avail
Fix Phase	E/E	Avail Personnel	Access to Acft	Parts Avail
Fix Phase	Hydro	Hydro Capable	Jack if Required	Awaiting on other shops



Ideal State Concepts

- **Improve/revise jet work cards**
 - Reduce redundancies
- **Improve supply partnership**
- **Improve partnership between flight line – Backshops / ISO**
- **Co-ordinate sub-processes to improve balance of flow**
- **Immediately start fixing / inspect as you go**
- **Change engines / eliminate look & fix phase for jets or dedicated engine work from wash through fix & inspect once.**
- **Make AA a priority "like FOL"**



Change Ideas

- Remove useless or redundant tasks from work cards with less road blocks (QA / NG)
- Power ON/OFF conditions? Coordinate with shops to complete jobs that need power
- More ops involvement (schedule for possibility of post dock early or late – have back up plan)
- Better yield % for crew chief for aircraft prep
- Fly on Monday
- Change engines with 1000 hours
- Are pre-checks required? (If aircraft just flew with no major problems and a post flight inspection was done)
- QA as needed (i.e. Once a work card is complete or at very end of fix phase)
- Keep people out of each others way
- Re-write engine work cards
- Jet shop start look phase when ISO is moving stands and de-paneling
- Get parts on order before pre-planning
- Not having a complete understanding of the total process along with the important roll each shop/person plays (cooperation)
- ISO dock communication to each work center could be overwhelming and time consuming. How can we communicate better and more efficiently?



Change Ideas (cont.)

- **Jets work look and fix phase as one**
- **Input to output flow. Meantime after last flight and pre-checks**
- **Pre-dock, checks, wash on same day**
- **Looks fix phase put together “multiple functions combining”**
- **Start day shift on Monday**
- **Dedicated ISO crew chief from all shops stay with aircraft from start to finish**
- **Pre-checks: We need each AFSC to create a critical inspection list of high failure items**
- **Move away from day mentality work fix phase when opportunity arises. Flexibility**
- **Stands that are user friendly**
- **MXG/CC needs to direct QA to quit with 100% KTL's of ISO. It should be random unless trend dictates 100%**
- **Supply person assigned to ISO during ISO through post dock**
- **Schedule last fly day on a Monday (we can fix minor flight write-ups, configure for ISO, then pre-dock on Tuesday morning)**
- **Examine a model of similar aircraft or weapon system (ie. E3, Tymo C, D checks Macon Airport Facility)**



Change Ideas (cont.)

- **More people for wash**
- **Potential bottleneck ISO & Structures**
- **Jets and other AFSC's need to consider doing SUTA's/RUTA's on weekends when they have an ISO aircraft (time saved 16 hours)**
- **Standardize back lines (ie flow out back line itself)**
- **ISO works the weekends when they have an aircraft**
- **Reduce the flying schedule during ISO weeks or increase shop manning to free up maintenance personnel**
- **Boeing data – help re-write work cards**
- **Last flight, post flight, refuel, lox, mc and tow into hangar with no down time**



Constraints

- **Northrop Grumman**
- **QA**
- **Supply (LRS) work for MXG**
- **How we schedule (policies)**
- **Qualified Personnel**
- **Stovepipe specialties / job description – restricts flexibility**
- **Other than aircraft work (extra duties/responsibilities)**
- **Leader commitment to team: improvements (all parties)**
- **Trust (institutionalize)**
- **Dedicated ISO team**
- **LRS manning**
- **Tools point of use policy**
- **Supplies point of use and levels**
- **Visual control / jumbo tron control tools**
- **Jets – 3 shifts, hard charges, go at it**



Constraints (cont.)

- **Top cover - assurances from supervision**
- **Training / CBT's – EPR's – distractors**
- **ISO is NOT a priority**
- **Air compressor**
- **Meetings**
- **Catch 22 – Priority Battle**
- **Competing tasks / resources**
 - **Mod's / DD's / Extended downtime / SSID's / SB's**
- **Implement now vs long term**



Anticipated Improvements

- **List anticipated improvements**
- **Use before/after photos as appropriate**



Engines Target Areas

	Impact	Difficulty
▪ Look	3	1
▪ Fix	3	3
▪ Backline	2	2
▪ Pre Checks	2	1



Engines – Improvement Opportunities

- **Re-flow fix phase workcards**
- **Standardize backline**
- **Benchmark other bases and industry**
- **Supply person in ISO**
- **Dedicated ISO crew**
- **Parts on order early**
- **Critical inspection item listing**
- **Jets work during stands and de-panel**
- **Change engines with > 1,000 hours**



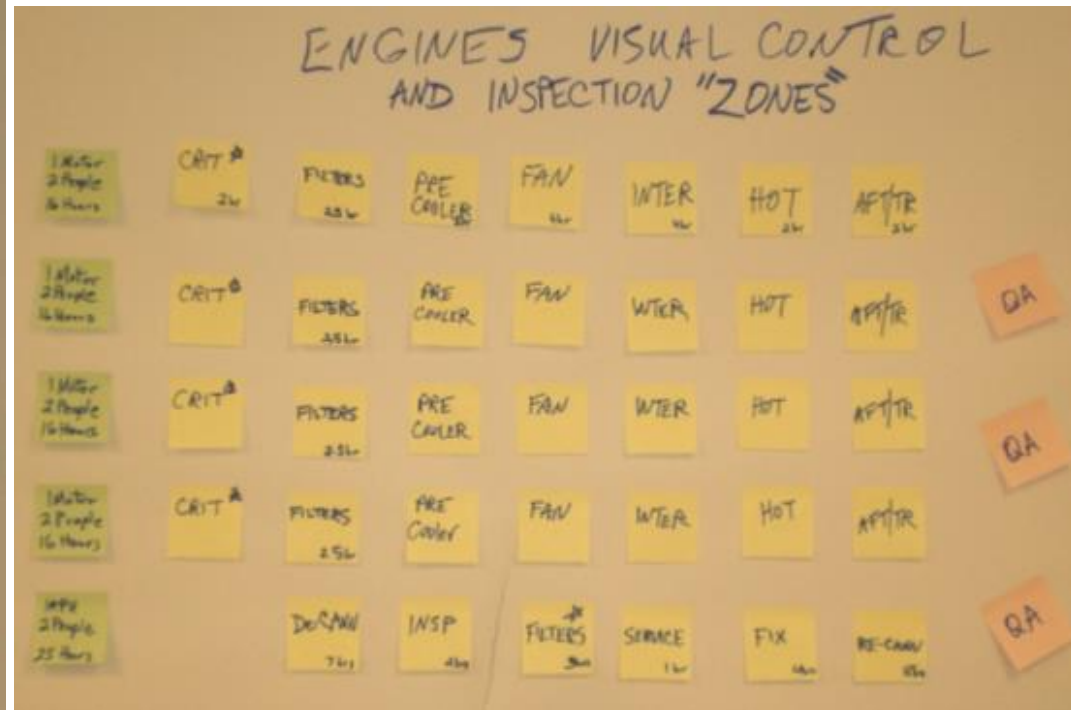
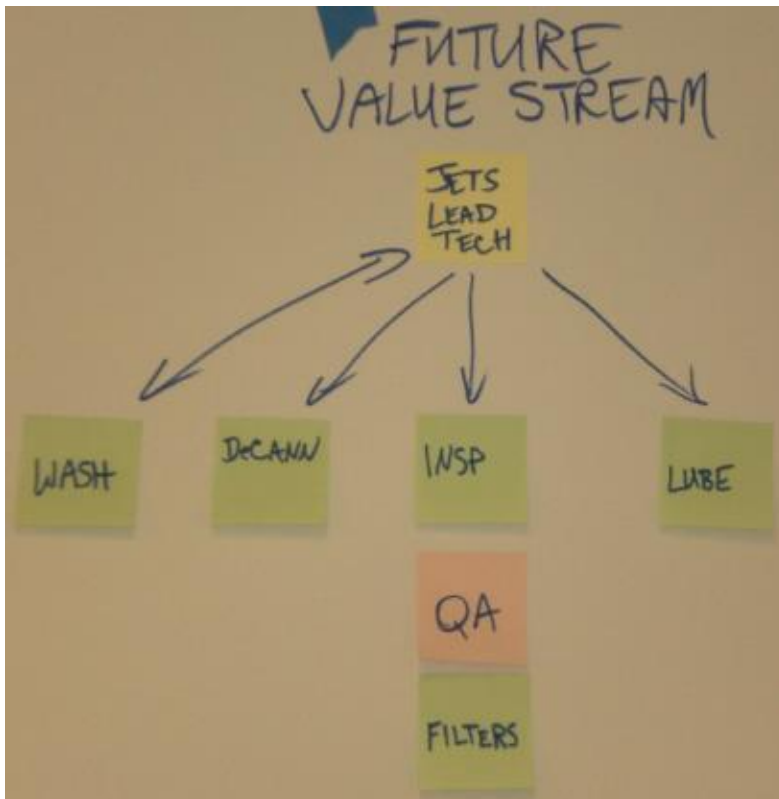
Engines – Plan of Attack

- **Look Phase**
 - Map out current state
 - Identify what to change
 - Flow out new process
 - Flow out new work cards
 - Perform the re-write

- **Fix Phase (Not addressed during event)**
 - Identify high break items
 - Prioritize
 - Explore improvement opportunities
 - Build a Fix plan



Future State Jet Flow & Inspection Zones





Engines – What to Change

- **Re-write workcards**
- **Standardize flow**
- **Benefits**
 - **Training**
 - **Planning and scheduling**
 - **Process discipline**
 - **Creating flow**
 - **Clear accountability and responsibility**

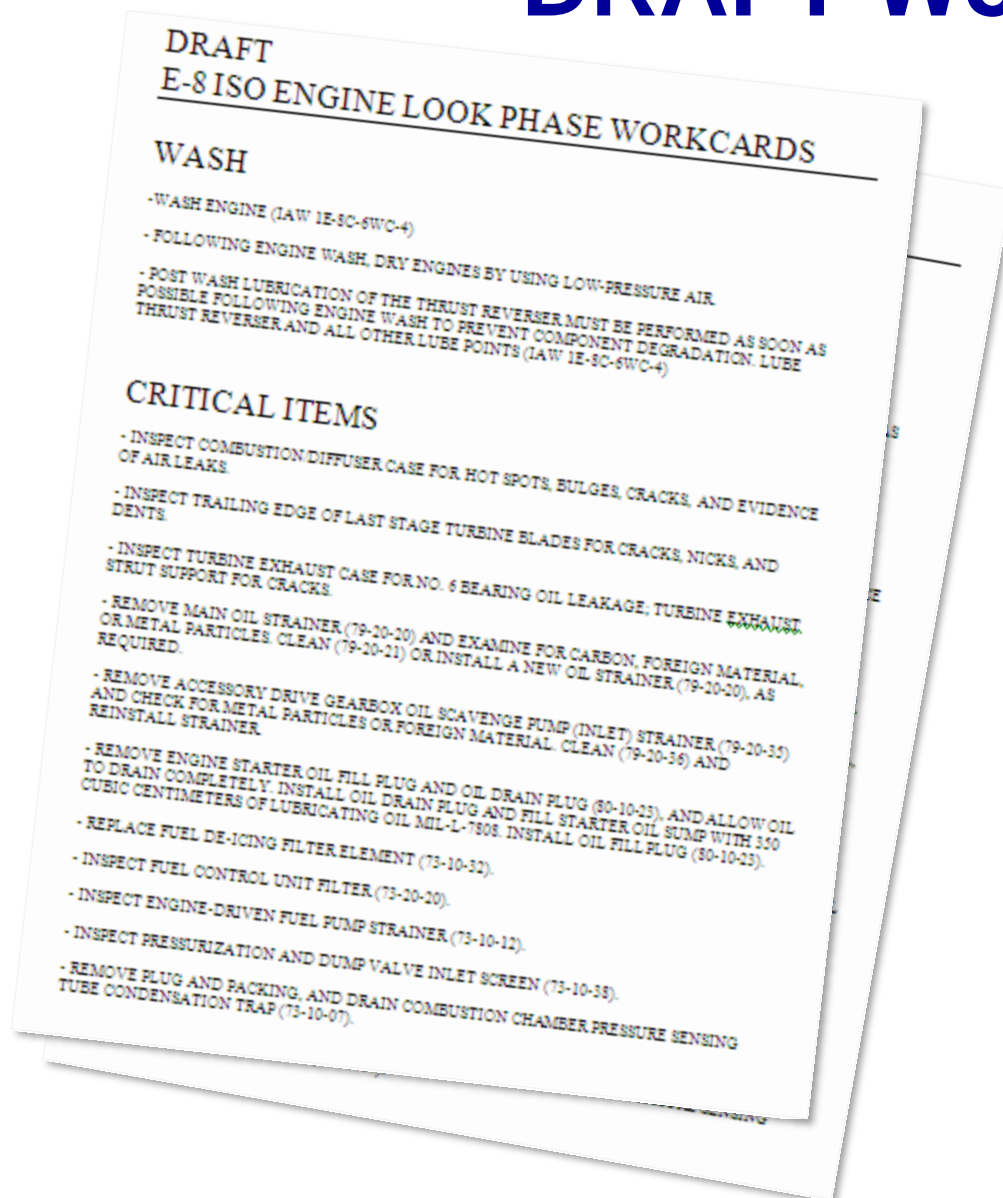


Engine Workcard Re-write

- **Remove redundancies**
- **More specific (too generalized)**
- **Group by zones**
 - **Bite-size chunks performed and signed off by a single team**
 - **Problem is that technicians re-inspect others' work after handoff, and depth of inspection is open to interpretation**
- **Explore removing workcard items that are inspected during post/pre-flight (when possible)**
- **Explore using a tiger team to work engine-by-engine**



Engine Look Phase DRAFT Workcards

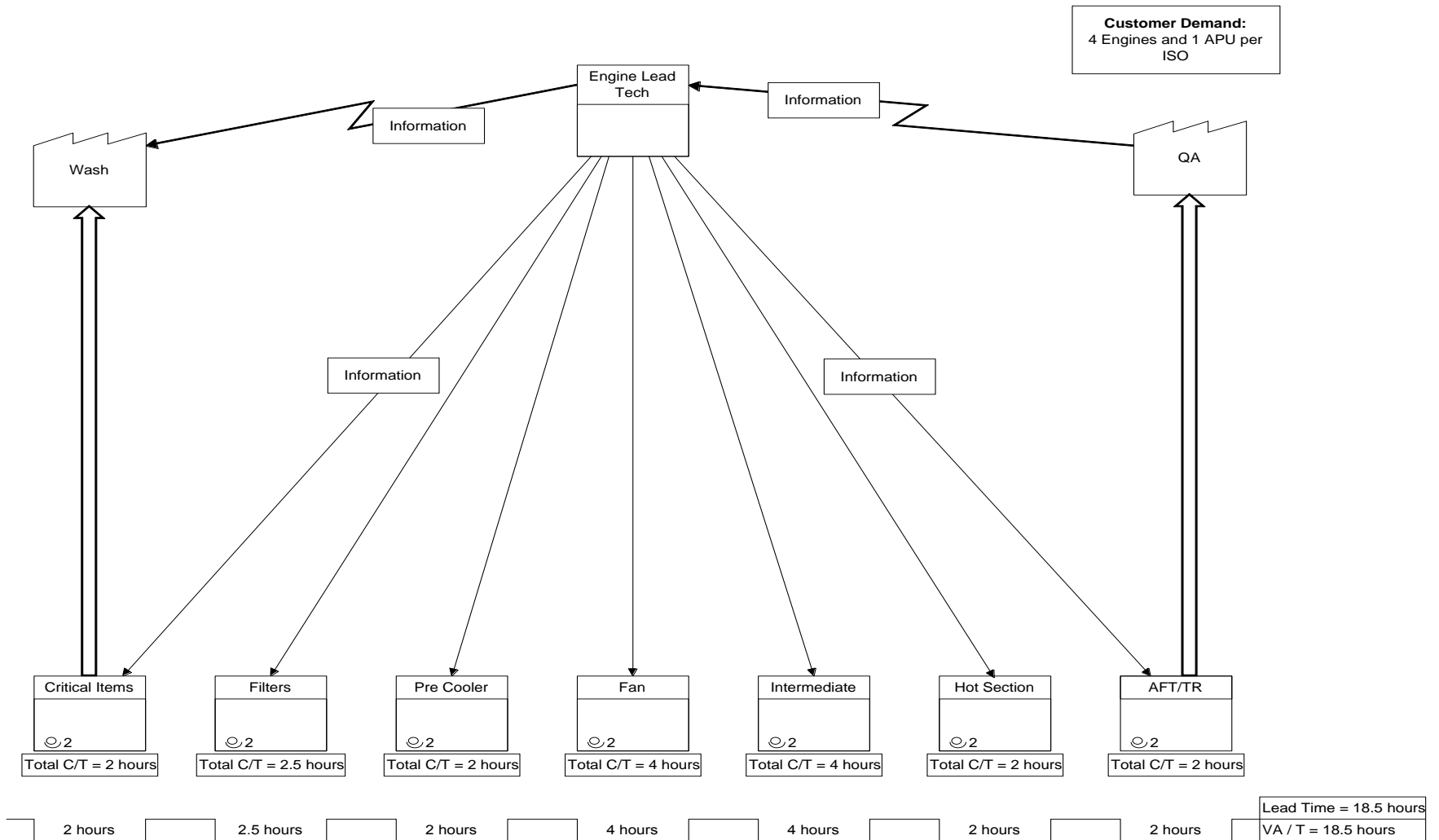


Engineers, ES, AFETS, SMEs, and ACC A4Y WST participated in developing draft.



E-8 ISO Engine Look Phase Value Stream

Stream (one engine)





E-8 ISO Engine Look Phase Visual Control Board

Aircraft:

As of:

Engine / APU	Inspection Zones							Totals
#1 Eng	Critical Items	Filters	Pre Cooler	Fan	Inter-mediate	Hot Section	AFT/TR	18.5
	Hours	2	2.5	2	4	4	2	
#2 Eng	Critical Items	Filters	Pre Cooler	Fan	Inter-mediate	Hot Section	AFT/TR	18.5
	Hours	2	2.5	2	4	4	2	
#3 Eng	Critical Items	Filters	Pre Cooler	Fan	Inter-mediate	Hot Section	AFT/TR	18.5
	Hours	2	2.5	2	4	4	2	
#4 Eng	Critical Items	Filters	Pre Cooler	Fan	Inter-mediate	Hot Section	AFT/TR	18.5
	Hours	2	2.5	2	4	4	2	
APU	De-Cann	Inspect	Filters	Service	Fix	Re-Cann		25
	Hours	7	2	3	1	4	8	



Future State ISO Flow

Current ISO Schedule

- ISO Due Date 18-Jan-09
- Scheduled Input 9-Jan-09
- Scheduled Output 4-Feb-09

Proposed ISO Schedule

- Schedule Input 19-Jan-09 (Swings)
- Schedule Output 4-Feb-09
- Work during UTA (24-25-Jan-09)



Benefits

- Increase aircraft availability to support mission requirement by 10 calendar days
- Increase availability of maintenance personnel to flightline for 10 calendar days

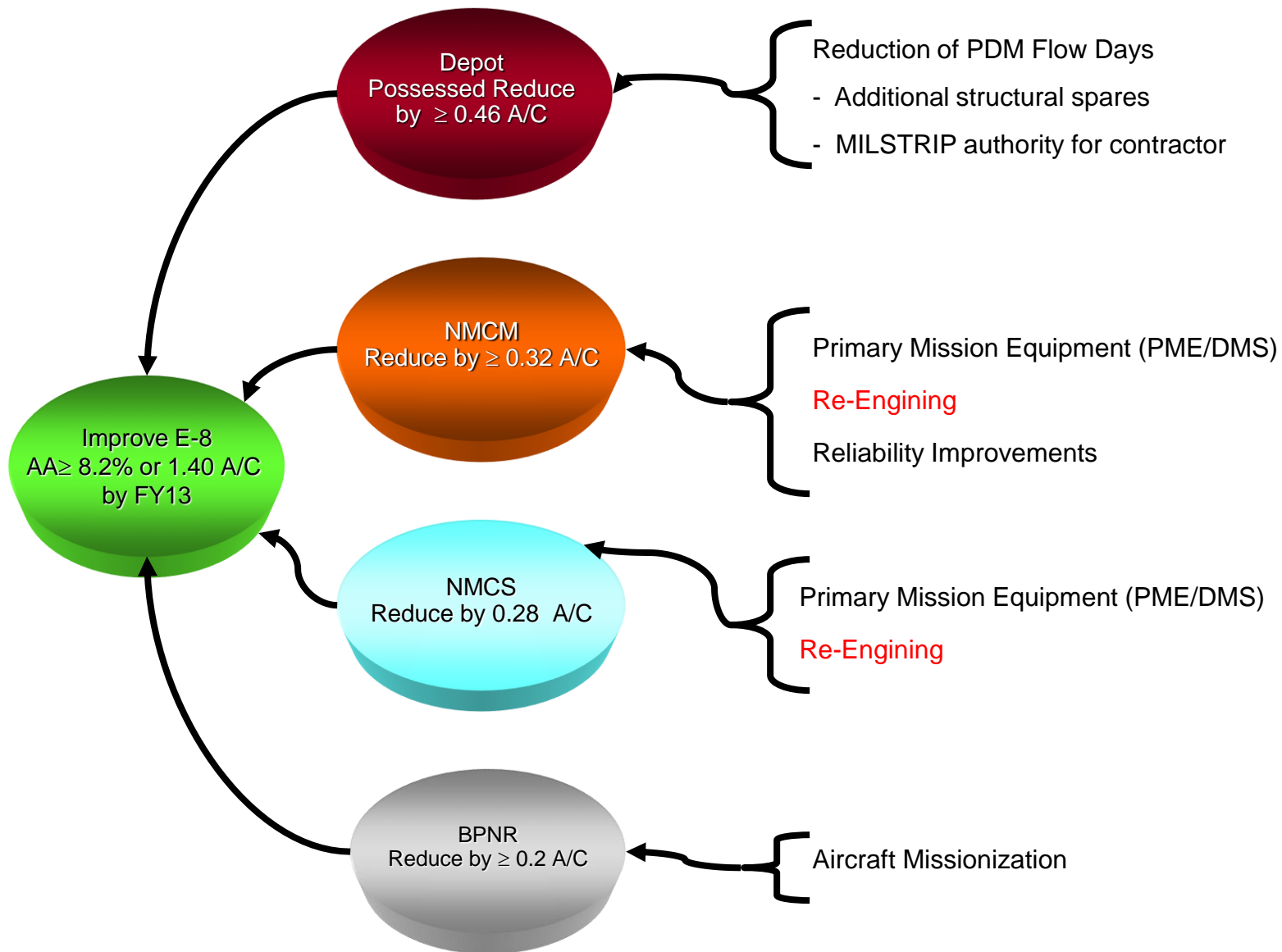


Future State ISO Flow

January 2009							Search Calendar
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Jan 4	5	6	7	8	9	10	
	Aircraft Available	Aircraft Available	Aircraft Available	Aircraft Available	Aircraft Available Original ISO input date	Aircraft Available	
Jan 4 - 10							
11	12	13	14	15	16	17	
Aircraft Available	Aircraft Available	Aircraft Available	Aircraft Available	Aircraft Available	Aircraft Available	Aircraft Available	
Jan 11 - 17							
18	19	20	21	22	23	24	
Aircraft Available	Aircraft Available Aircraft land by 1500 ISO input 1730 (ISO start) Wash prep/ Wash start	Wash	Look Phase Stands / De-panel	Look Phase	Look Phase	Look Phase UTA	
Jan 18 - 24							
25	26	27	28	29	30	31	
Look Phase UTA	Fix Phase Look Phase	Look Phase	Fix Phase	Fix Phase	Fix Phase / Backlines		
Jan 25 - 31							
Feb 1	2	3	4	5	6	7	
	Fix Phase / Backlines	Post-dock in the afternoon Pre-flight	Original ISO output date Aircraft Available to fly scheduled sortie @ 1230L				
Feb 1 - 7							



E-8 Availability Initiatives





Before/After VA/NVA Steps and Flow Times

	BEFORE	AFTER	DELTA
Value Added Steps	27	27	0
Non-Value Added Steps	35	29	6
Flow Time	662 hrs	398 hrs	264 hrs

AA Target = .25
(1 acft avail for 3 mos)

AA Potential using new process = .33
(1 acft avail for 4 mos)

Jets Look Phase Flow Time	
Current State	144 hrs +/- 48
Future State	72 hrs +/- 24

Bottom line: 0730 day 17 ready to fly!



ISO Process Key Measures

ISO PHASE METRICS

A0006

2 -17 Jan 09

	Std	1st Sortie	2nd Sortie	3rd Sortie	First 3 sorties
AA RATE	19 ↓	18.1	9.0	24.0	18.4
Mission Effectiveness	78 ↑	74.2	79.6	70.6	77.8
MC RATE	78 ↑	74.2	79.6	70.6	77.8
FSE RATE	75 ↑	76.2	100.0	64.7	82.8
MTX DEV RATE	17 ↓	21.8	0.0	32.4	15.9
OPS DEV RATE	17 ↑	21.8	0.0	32.4	15.9
ABORT RATE	9 ↓	8.0	6.1	9.0	7.7
BREAK RATE	24 ↓	26.0	21.2	28.6	20.8
12 HR FIX RATE	72 ↓	72.0	57.1	77.8	66.0
CANN RATE	10 ↓	5.2	0.0	7.9	3.5
REP / REC RATE	4 ↑	2.8	1.6	3.4	2.3
Delayed Disc Rate	95 ↓	92.2	95.9	90.6	94.7



ISO Process Key Measures

Flying Data	1st Sortie	2nd Sortie	3rd Sortie	First 3 sorties
Effective Sortie	0	0	0	0
Deviations	0	0	0	0
Late Take Offs	0	0	0	0
Early Take Offs	0	0	0	0
MTX Deviations	0	0	0	0
Ops Deviations	0	0	0	0
Air Aborts	0	0	0	0
Air Abort/IFE's	0	0	0	0
In-Flight Emergency	0	0	0	0
Ground Aborts	0	0	0	0
# of code 1 PRD's	0	0	0	0
# of code 3 PRD's	0	0	0	0
# of code 3 PRD's	0	0	0	0
# of code 4 PRD's	0	0	0	0
Total PRD's	0	0	0	0
12 Hr Fixes	0	0	0	0
Repeats	0	0	0	0
Rekurs	0	0	0	0
Hours Flown	0.0	0.0	0.0	0



ISO Process Key Measures

ISO Details	Current ISO	Last Iso	Previous ISO	12 month Avg
Total Hours Fly to Fly	0	0	0	0
Fly - Fly Days	0	0	0	0
ACFT Non-Availability Hours	0	0	0	0
ACFT Non-Availability Days	0	0	0	0
NMC Conditions Found	0	0	0	0
PMC Conditions found	0	0	0	0
Delayed Discrepancies before ISO	0	0	0	0
Delayed Discrepancies after ISO	0	0	0	0
Overall KTL Pass Rate	0.0%	0.0%	0.0%	0.0%
Dedicated ISO Crew On Time Rate	0.0%	0.0%	0.0%	0.0%
Look Phase on Time Start Rate	0.0%	0.0%	0.0%	0.0%
Dedicated ISO Crew Level	0.0%	0.0%	0.0%	0.0%
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
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	0	0	0	0
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Detailed Data
keep but not
displayed unless
below TBD goal.



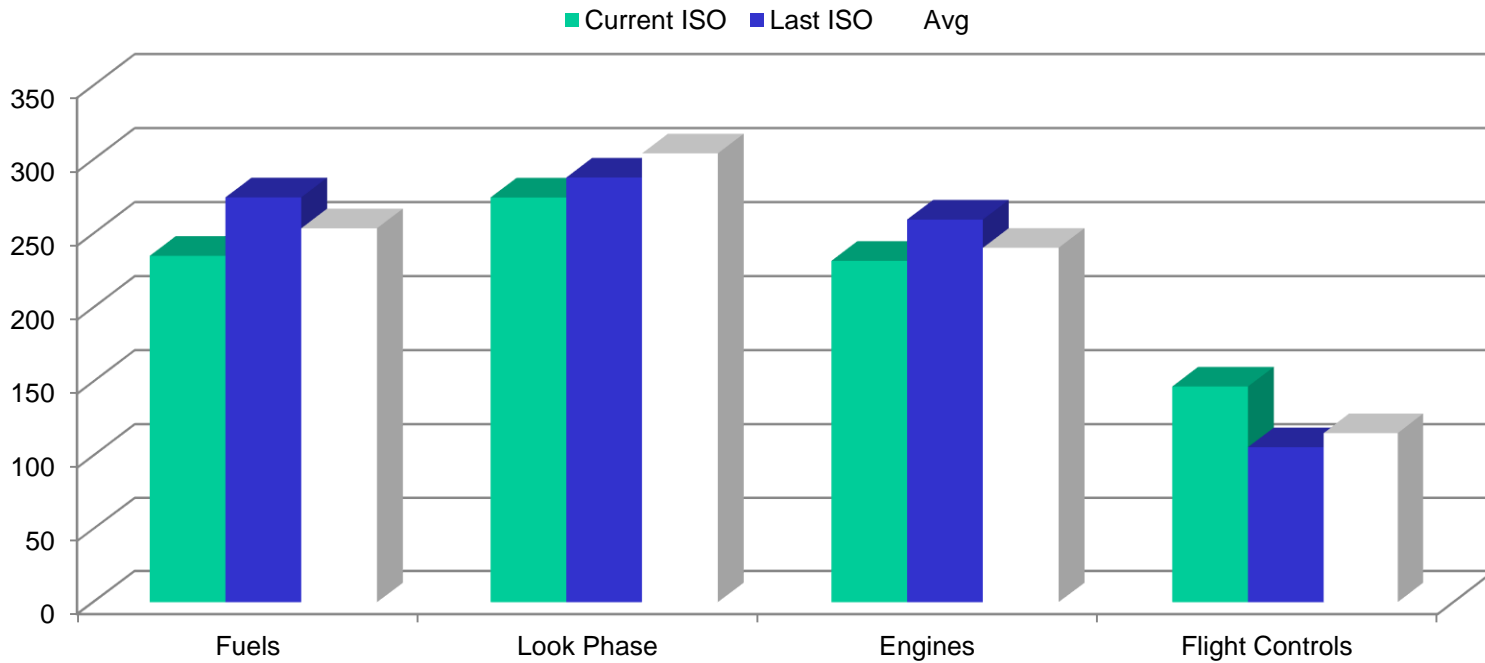
ISO Process Key Measures

NMC SYSTEM DRIVERS						
WUC SYSTEM	SYS NARRATIVE	NMCB	NMCS	NMCM	Total	% OF TOTAL
46000	FUEL SYSTEM	235.1	21.6	163.1	419.8	22.6%
03000	LOOK PHASE OF SCHEDULED INSPECTIONS	274.5	0.0	121.3	395.8	21.4%
81000	SURVEILLANCE RADAR SYSTEM	58.0	145.4	73.0	276.4	14.9%
23000	TURBOFAN PROPULSION SYSTEM	43.1	0.8	187.8	231.7	12.5%
41000	AIR CONDITIONING, PRESSURIZATION, AND SURF	0.0	73.5	73.3	146.8	7.9%
14000	FLIGHT CONTROLS	45.5	50.0	37.7	133.2	7.2%
51000	INSTRUMENTS	0.0	61.0	27.2	88.2	4.8%
11000	AIRFRAME	2.5	0.0	68.5	71.0	3.8%
24000	AUXILIARY POWER PLANT (TCI)	0.0	0.0	25.9	25.9	1.4%
82000	COMPUTER AND DATA DISPLAY	0.0	0.0	18.5	18.5	1.0%
13000	LANDING GEAR	0.0	0.0	17.2	17.2	0.9%
45000	HYDRAULIC AND PNEUMATIC POWER SUPPLY	0.0	0.0	14.0	14.0	0.8%
69000	MISCELLANEOUS COMMUNICATIONS EQUIPMENT	0.0	0.0	8.2	8.2	0.4%
42000	ELECTRICAL POWER SUPPLY	0.0	0.0	6.9	6.9	0.4%



ISO Process Key Measures

Leading Drivers





Implementation Plan (Jets)

- **Workcards in JIMIS**
 - **Approved red-line?**
 - **Local checklist?**
 - **Val/ver on second ISO after event?**
- **Personnel requirements definition / availability / scheduling**
- **Finalize local checklist**
- **Additional AFTO 22s (after new workcards drop into JIMIS)**
- **Pre cooler AFTO 22 followup**
- **Visual Tracker / Control**
- **Coordinate with E&E**
- **Coordinate on stands**
- **Training plan for new process**



Implementation Plan

Action	OPR	Start Date	End Date	Event	Project	Do-It
Chiefs determine how to score KTL	CMSgt Patterson	20 Nov 08	20 Dec 08			X
Make A/C available until 1030 on day of pre-dock (Normally a Mon)	TSgt Williams	20 Nov 08	15 Jan 09			X
A/C must be configured for ISO (Fuel, LOX) and in the dock nlt 1730 day of pre-dock	TSgt Oneill	20 Nov 08	15 Jan 09			X
A/C must have LOX serviced prior to last flight (65L or above)	TSgt Oneill	20 Nov 08	15 Jan 09			X
A/C available for post-dock 12 hrs after backline complete	TSgt Barreto	20 Nov 08	15 Jan 09			X
A/C must be scheduled for first available flight following post-dock	TSgt Williams	20 Nov 08	15 Jan 09			X
Specialists will remove their own panels (at de-panel)	MSgt Hathaway	20 Nov 08	15 Jan 09			X
ISO scheduled during UTA, not during training days	TSgt Williams	20 Nov 08	15 Jan 09			X



Implementation Plan

Action	OPR	Start Date	End Date	Event	Project	Do-It
All Specialists involved in ISO Cell Team report to Dock Controller within 2 hrs of notification (ready to start at beginning of de-panel) Will be released at the end of their Look Phase and/or QA.	TSgt Barreto	20 Nov 08	15 Jan 09			X
Order/Confirm/Upgrade all known DD parts at pre-planning meeting Tues prior to pre-dock	TSgt Hauck	20 Nov 08	15 Jan 09			X
Confirm pre-checks are eliminated	MSgt Carbajal	20 Nov 08	15 Jan 09			X
Revise workcards (ISO)	TSgt Wallace	20 Nov 08	15 Feb 09		X	
Revise workcards (Jets)	MSgt Carbajal	20 Nov 08	15 Jan 09			X
Sheetmetal signs off IMDS after Look Phase	TSgt Baker	20 Nov 08	20 Dec 08			X
Supply personnel in ISO (dayshift) from de-panel through end of Look Phase	SSgt Thomas	20 Nov 08	20 Dec 08			X



Implementation Plan

Action	OPR	Start Date	End Date	Event	Project	Do-It
Identify at pre-planning meeting TCTO POC while in ISO	TSgt Williams	20 Nov 08	20 Dec 08			X
Review support equipment authorizations (AGE)	CMSgt Patterson	20 Nov 08	20 Dec 08			X
Create Visual ISO Production board <ul style="list-style-type: none"> - Interval by hr blocks - running clock - limited read/write capabilities - goal not met ID'd in red (comment box) - running total of completion for ISO and each workcenter - access by all wing members - link other key info (MICAP slide) - ID critical path - legend to show status - show important data/times - one sheet for all 	Lt Thomas	20 Nov 08	15 Jan 09		X	



Questions?





Top 10 Flow Times (Normal)

<i>Process Step</i>	<i>Shop</i>	<i>Trigger</i>	<i>Done</i>	<i>Flow Time - Best</i>	<i>Flow Time - Normal</i>	<i>Flow Time - Worse</i>	<i>Touch - Best</i>	<i>Touch - Normal</i>	<i>Touch - Worse</i>	<i>Number People</i>	<i>% Yield</i>
Wash	Structur es	Wash C/W	CAMS C/W	172	192	212	100	120	140	2	90
Look Phase	ISO	De-Panel C/W	Work Cards C/W	164	168	172	36	40	44	6	95
Fix Phase	JETS	QA C/W	CAMS C/W	144	168	168	70	84	84	14	80
Look Phase	JETS	Jet in Hangar	Work Cards C/W	166	166	166	80	84	96	6-10	80
Minor Fix Phase	Structur es	Look Phase C/W	CAMS C/W	140	150	160	140	150	160	6	95
Fix Phase	A/R	ISO Dock Chief	CAMS C/W	0	100	336	0	96	320	9	95
Fix Phase	E/E	ISO Dock Chief	CAMS C/W	72	96	120	12	16	20	9	70
Wash	ISO	ISO Dock Chief	Wash C/W	72	80	96	8	24	36	6	100
Last Flight		Last Flight	Pre Dock	24	72	386	0	0	0	0	100
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	12	24	72	3	50



Top 10 Flow Times (Worse Case)

Process Step	Shop	Trigger	Done	Flow Time - Best	Flow Time - Normal	Flow Time - Worse	Touch - Best	Touch - Normal	Touch - Worse	Number People	% Yield
Last Flight		Last Flight	Pre Dock	24	72	386	0	0	0	0	100
Fix Phase	A/R	ISO Dock Chief	CAMS C/W	0	100	336	0	96	320	9	95
Pre-Flight	ISO	Backline C/W	Pre-flight C/W	24	48	240	6	8	10	6	90
Wash	Structur es	Wash C/W	CAMS C/W	172	192	212	100	120	140	2	90
Look Phase	ISO	De-Panel C/W	Work Cards C/W	164	168	172	36	40	44	6	95
Fix Phase	JETS	QA C/W	CAMS C/W	144	168	168	70	84	84	14	80
Look Phase	JETS	Jet in Hangar	Work Cards C/W	166	166	166	80	84	96	6-10	80
Minor Fix Phase	Structur es	Look Phase C/W	CAMS C/W	140	150	160	140	150	160	6	95
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	12	24	72	3	50
Fix Phase	E/E	ISO Dock Chief	CAMS C/W	72	96	120	12	16	20	9	70



Top 10 Flow Time Flow Stoppers (Worse Case)

<i>Process Step</i>	<i>Shop</i>	<i>Flow Stopper - 1</i>	<i>Flow Stopper - 2</i>	<i>Flow Stopper - 3</i>
Last Flight		Acft Schedule	Avail Personnel	
Fix Phase	A/R	Parts from Supply	Parts being Repaired	Untrained People
Pre-Flight	ISO	Support Equip	Ops Avail / Weather	Acft Ready
Wash	Structures	Parts Avail		
Look Phase	ISO	Prep for other Mx	Training Days	C/C all Calls
Fix Phase	JETS	Stands	Supply/Parts	Acft Priorities
Look Phase	JETS	Stands	Power Capability	
Minor Fix Phase	Structures	People	Air	
Last Flight	Crew Chiefs	Flying Schedule	Manning	Equip Failure
Fix Phase	E/E	Avail Personnel	Access to Acft	Parts Avail



Top 10 Touch Times (Normal)

<i>Process Step</i>	<i>Shop</i>	<i>Trigger</i>	<i>Done</i>	<i>Flow Time - Best</i>	<i>Flow Time - Normal</i>	<i>Flow Time - Worse</i>	<i>Touch - Best</i>	<i>Touch - Normal</i>	<i>Touch - Worse</i>	<i>Number People</i>	<i>% Yield</i>
Minor Fix Phase	Structures	Look Phase C/W	CAMS C/W	140	150	160	140	150	160	6	95
Wash	Structures	Wash C/W	CAMS C/W	172	192	212	100	120	140	2	90
Fix Phase	A/R	ISO Dock Chief	CAMS C/W	0	100	336	0	96	320	9	95
Fix Phase	JETS	QA C/W	CAMS C/W	144	168	168	70	84	84	14	80
Look Phase	JETS	Jet in Hangar	Work Cards C/W	166	166	166	80	84	96	6-10	80
Look Phase	ISO	De-Panel C/W	Work Cards C/W	164	168	172	36	40	44	6	95
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	12	24	72	3	50
Wash	ISO	ISO Dock Chief	Wash C/W	72	80	96	8	24	36	6	100
Backline	ISO	Repanel C/W	BackLine C/W	8	24	48	7	23	47	4	80
Fix Phase	Radar	ISO Dock Chief	Job C/W	10	24	96	8	20	84	4-8	85



Top 10 Touch Times (Worse Case)

Process Step	Shop	Trigger	Done	Flow Time - Best	Flow Time - Normal	Flow Time - Worse	Touch - Best	Touch - Normal	Touch - Worse	Number People	% Yield
Fix Phase	A/R	ISO Dock Chief	CAMS C/W	0	100	336	0	96	320	9	95
Minor Fix Phase	Structures	Look Phase C/W	CAMS C/W	140	150	160	140	150	160	6	95
Wash	Structures	Wash C/W	CAMS C/W	172	192	212	100	120	140	2	90
Look Phase	JETS	Jet in Hangar	Work Cards C/W	166	166	166	80	84	96	6-10	80
Fix Phase	JETS	QA C/W	CAMS C/W	144	168	168	70	84	84	14	80
Fix Phase	Radar	ISO Dock Chief	Job C/W	10	24	96	8	20	84	4-8	85
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	12	24	72	3	50
Backline	ISO	Repanel C/W	BackLine C/W	8	24	48	7	23	47	4	80
Fix Phase	ISO	QA C/W	Acft Repaired	24	26	48	13	19	47	6	75
Look Phase	ISO	De-Panel C/W	Work Cards C/W	164	168	172	36	40	44	6	95



Top 10 Touch Time Flow Stoppers (Worse Case)

<i>Process Step</i>	<i>Shop</i>	<i>Flow Stopper - 1</i>	<i>Flow Stopper - 2</i>	<i>Flow Stopper - 3</i>
Fix Phase	A/R	Parts from Supply	Parts being Repaired	Untrained People
Minor Fix Phase	Structures	People	Air	
Wash	Structures	Parts Avail		
Look Phase	JETS	Stands	Power Capability	
Fix Phase	JETS	Stands	Supply/Parts	Acft Priorities
Fix Phase	Radar	Personnel	A/C Avail	Flt Line Mx
Last Flight	Crew Chiefs	Flying Schedule	Manning	Equip Failure
Backline	ISO	Bad Parts/Leaks	Support Personnel	AGE Support
Fix Phase	ISO	Parts/Hardware	Waiting on other Shops	
Look Phase	ISO	Prep for other Mx	Training Days	C/C all Calls



Bottom 10 Yields

Yield - % Right the First Time

<i>Process Step</i>	<i>Shop</i>	<i>Trigger</i>	<i>Done</i>	<i>Flow Time - Best</i>	<i>Flow Time - Normal</i>	<i>Flow Time - Worse</i>	<i>Touch - Best</i>	<i>Touch - Normal</i>	<i>Touch - Worse</i>	<i>Number People</i>	<i>% Yield</i>
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	12	24	72	3	50
Fix Phase	E/E	ISO Dock Chief	CAMS C/W	72	96	120	12	16	20	9	70
Look Phase	E/E	ISO Dock Chief	Work Cards C/W	24	36	72	12	17	20	9	70
Fix Phase	ISO	QA C/W	Acft Repaired	24	26	48	13	19	47	6	75
Fix Phase	JETS	QA C/W	CAMS C/W	144	168	168	70	84	84	14	80
Look Phase	JETS	Jet in Hangar	Work Cards C/W	166	166	166	80	84	96	6-10	80
Minor Fix Phase	E/E	Documentation	CAMS C/W	24	48	72	6	8	10	9	80
Backline	JETS	ISO Dock Chief	All Items Checked	24	48	48	14	20	28	7-14	80
Backline	ISO	Repanel C/W	BackLine C/W	8	24	48	7	23	47	4	80
De-panel	JETS	Stands C/W	De-Panel C/W	16	18	24	10	16	22	6-10	80



Bottom 10 Yields Flow Stoppers

<i>Process Step</i>	<i>Shop</i>	<i>% Yield</i>	<i>Flow Stopper - 1</i>	<i>Flow Stopper - 2</i>	<i>Flow Stopper - 3</i>
Fix Phase	A/R	95	Parts from Supply	Parts being Repaired	Untrained People
Minor Fix Phase	Structure s	95	People	Air	
Wash	Structure s	90	Parts Avail		
Look Phase	JETS	80	Stands	Power Capability	
Fix Phase	JETS	80	Stands	Supply/Parts	Acft Priorities
Fix Phase	Radar	85	Personnel	A/C Avail	Flt Line Mx
Last Flight	Crew Chiefs	50	Flying Schedule	Manning	Equip Failure
Backline	ISO	80	Bad Parts/Leaks	Support Personnel	AGE Support
Fix Phase	ISO	75	Parts/Hardware	Waiting on other Shops	
Look Phase	ISO	95	Prep for other Mx	Training Days	C/C all Calls



Top 10 Sources of Process Variation in Flow Time

Process Step	Shop	Trigger	Done	Flow Time - Best	Flow Time - Normal	Flow Time - Worse	Flow Time - Variation	Touch - Best	Touch - Normal	Touch - Worse	Touch Time - Variation	Number People	% Yield
Last Flight		Last Flight	Pre Dock	24	72	386	362	0	0	0	0	0	100
Fix Phase	A/R	ISO Dock Chief	CAMS C/W	0	100	336	336	0	96	320	320	9	95
Pre-Flight	ISO	Backline C/W	Pre-flight C/W	24	48	240	216	6	8	10	4	6	90
Last Flight	Crew Chiefs	Last Flight	Pre Dock	24	72	136	112	12	24	72	60	3	50
Fix Phase	Radar	ISO Dock Chief	Job C/W	10	24	96	86	8	20	84	76	4-8	85
Look Phase	Fuels	ISO Dock Chief	Workcards C/W	1	24	72	71	1	2	3	2	3	100
Look Phase	E/E	ISO Dock Chief	Work Cards C/W	24	36	72	48	12	17	20	8	9	70
Minor Fix Phase	E/E	Documentation	CAMS C/W	24	48	72	48	6	8	10	4	9	80
Fix Phase	E/E	ISO Dock Chief	CAMS C/W	72	96	120	48	12	16	20	8	9	70
Fix Phase	Hydro	ISO Dock Chief	Leak/Ops check C/W	24	48	72	48	4	8	12	8	2	90



Top 10 Flow Stoppers Causing Process Variation in Flow Time

<i>Process Step</i>	<i>Shop</i>	<i>Flow Stopper - 1</i>	<i>Flow Stopper - 2</i>	<i>Flow Stopper - 3</i>
Last Flight		Acft Schedule	Avail Personnel	
Fix Phase	A/R	Parts from Supply	Parts being Repaired	Untrained People
Pre-Flight	ISO	Support Equip	Ops Avail / Weather	Acft Ready
Last Flight	Crew Chiefs	Flying Schedule	Manning	Equip Failure
Fix Phase	Radar	Personnel	A/C Avail	Flt Line Mx
Look Phase	Fuels	Fuel Config	Avail Personnel	A/C equipment failure
Look Phase	E/E	Avail Personnel	Access to Acft	Parts Avail
Minor Fix Phase	E/E	Avail Personnel	Access to Acft	Parts Avail
Fix Phase	E/E	Avail Personnel	Access to Acft	Parts Avail
Fix Phase	Hydro	Hydro Capable	Jack if Required	Awaiting on other shops



Recurring/Multiple Flow Stoppers

Flow Stopper - 1	Total
Avail Personnel	7
Personnel	3
Specialist Priority	2
Equipment Failure	2
Stands	2
Supplies	2
Priority	2
Hydro Capable	2

Flow Stopper - 2	Total
Access to Acft	4
Flt line Mx	3
Supplies	3
Training Days	2
Avail Personnel	2

Flow Stopper - 3	Total
Parts Avail	4
Flt Line Mx	3
Avail Personnel	2
Untrained People	2



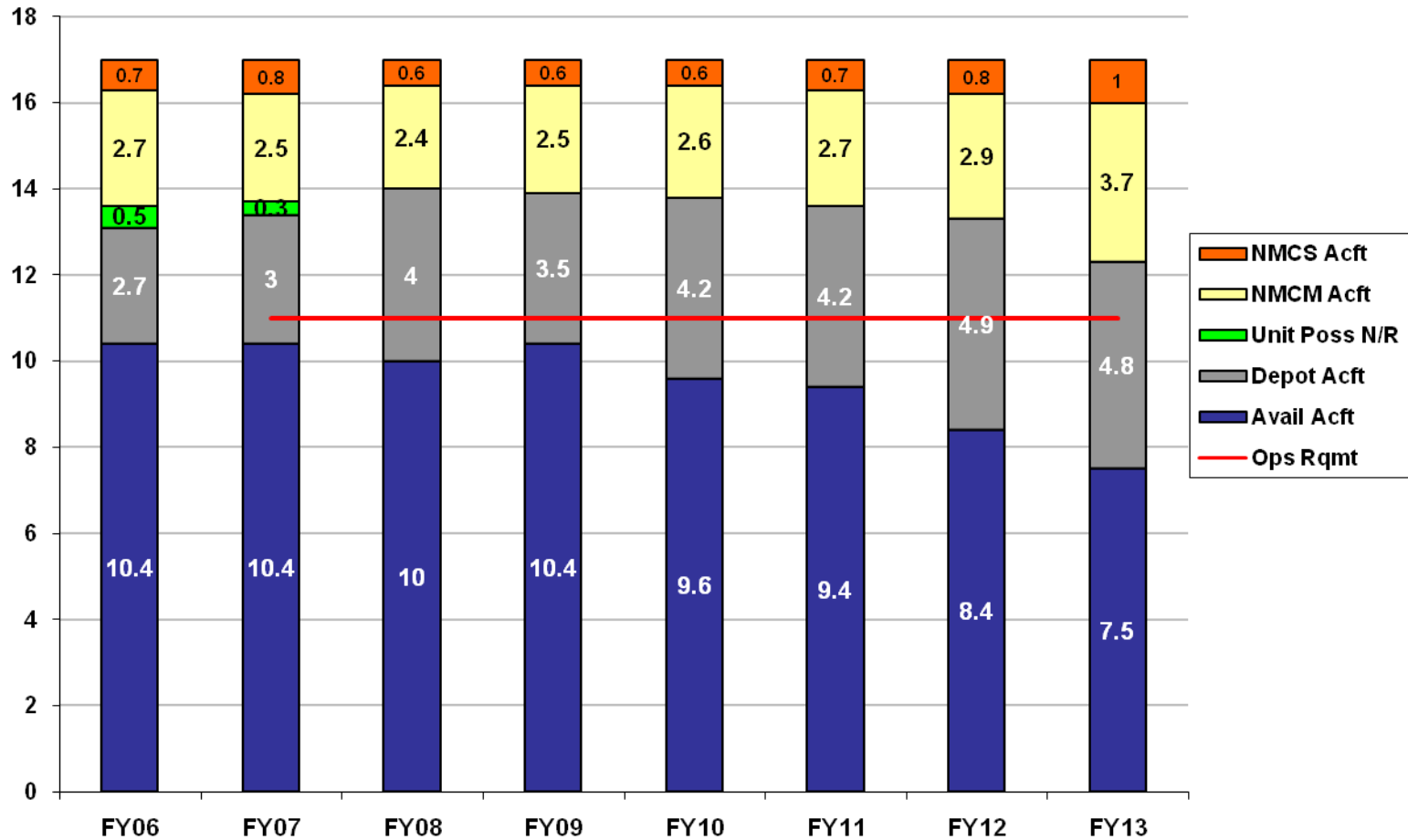
E-8 Data

This Briefing is:
UNCLASSIFIED



E-8 AAIP

- AA will decrease thru FY13 due to re-engining and DMS

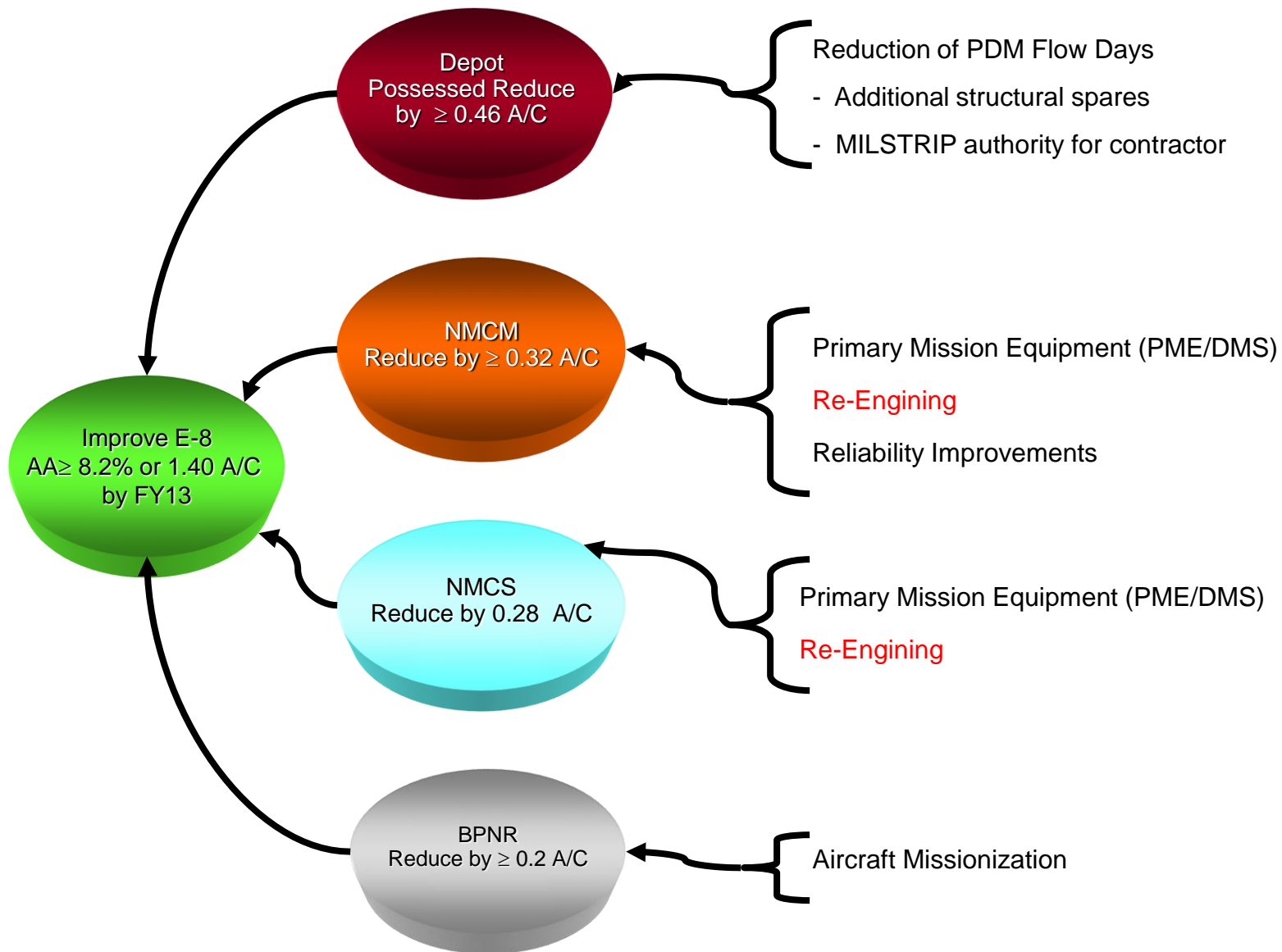


Total Aircraft Inventory

17	17	17	17	17	17	17	17
----	----	----	----	----	----	----	----



E-8 Availability Initiatives



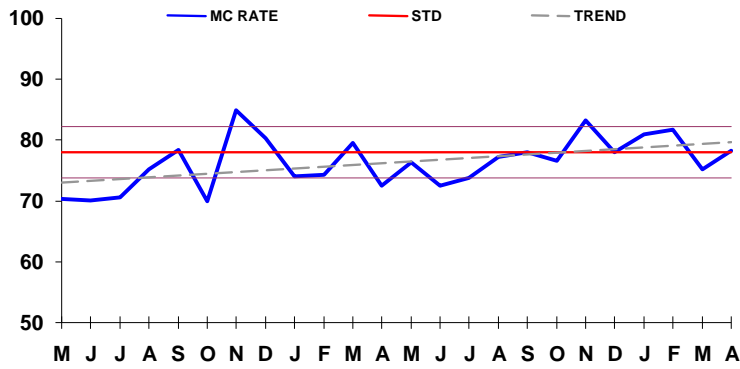


ACTIVE AF E-8C LAGGING

MAY 06 - APR 08

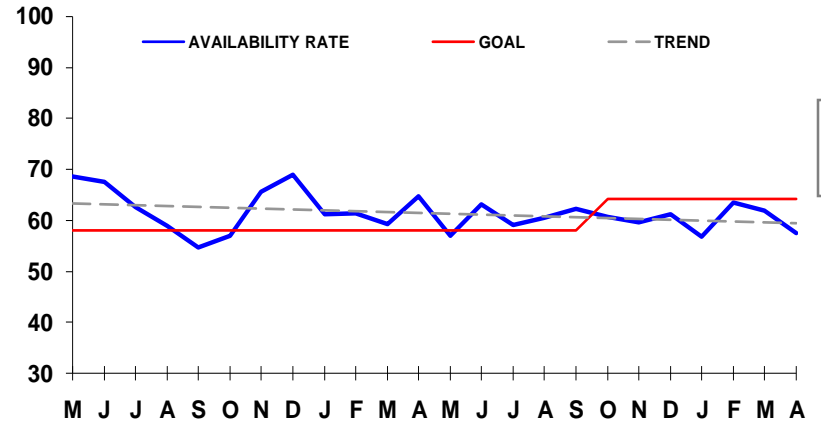
- MC
- TNMCM
- TNMCS
- LEADING

MC RATE



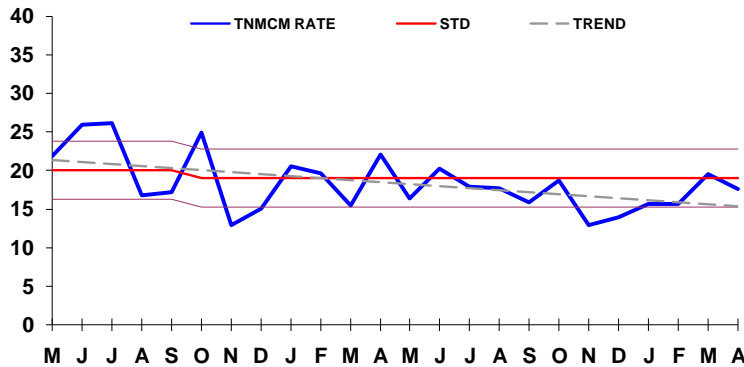
STD
78
↑
GOOD

AVAILABILITY RATE



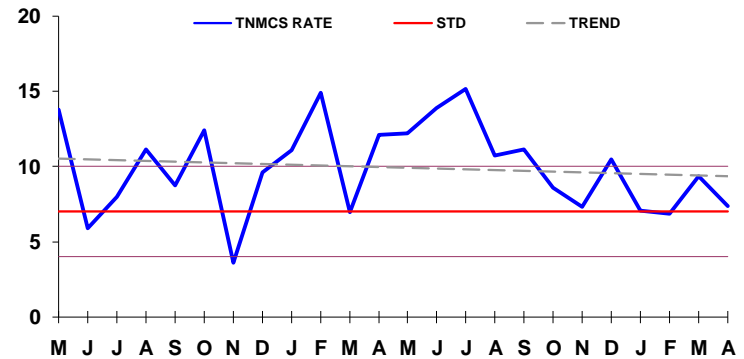
FY 08
64.2
↑
GOOD

TM RATE



GOOD
↓
STD
19

TS RATE

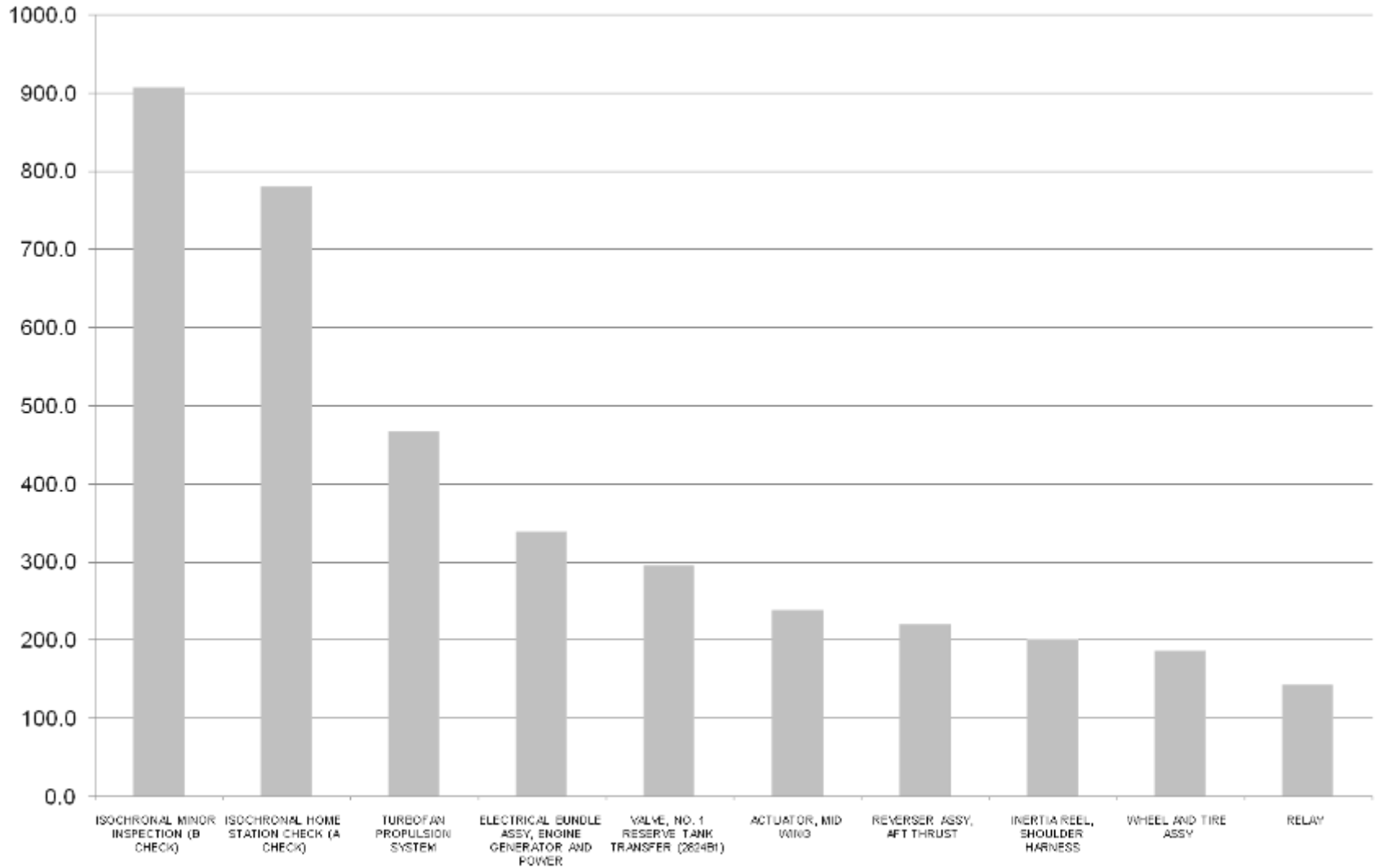


GOOD
↓
STD
7

M, TM, and TS Rates all trending in the right direction. AA has a slight negative trend, and is not projected to meet the ops requirement.

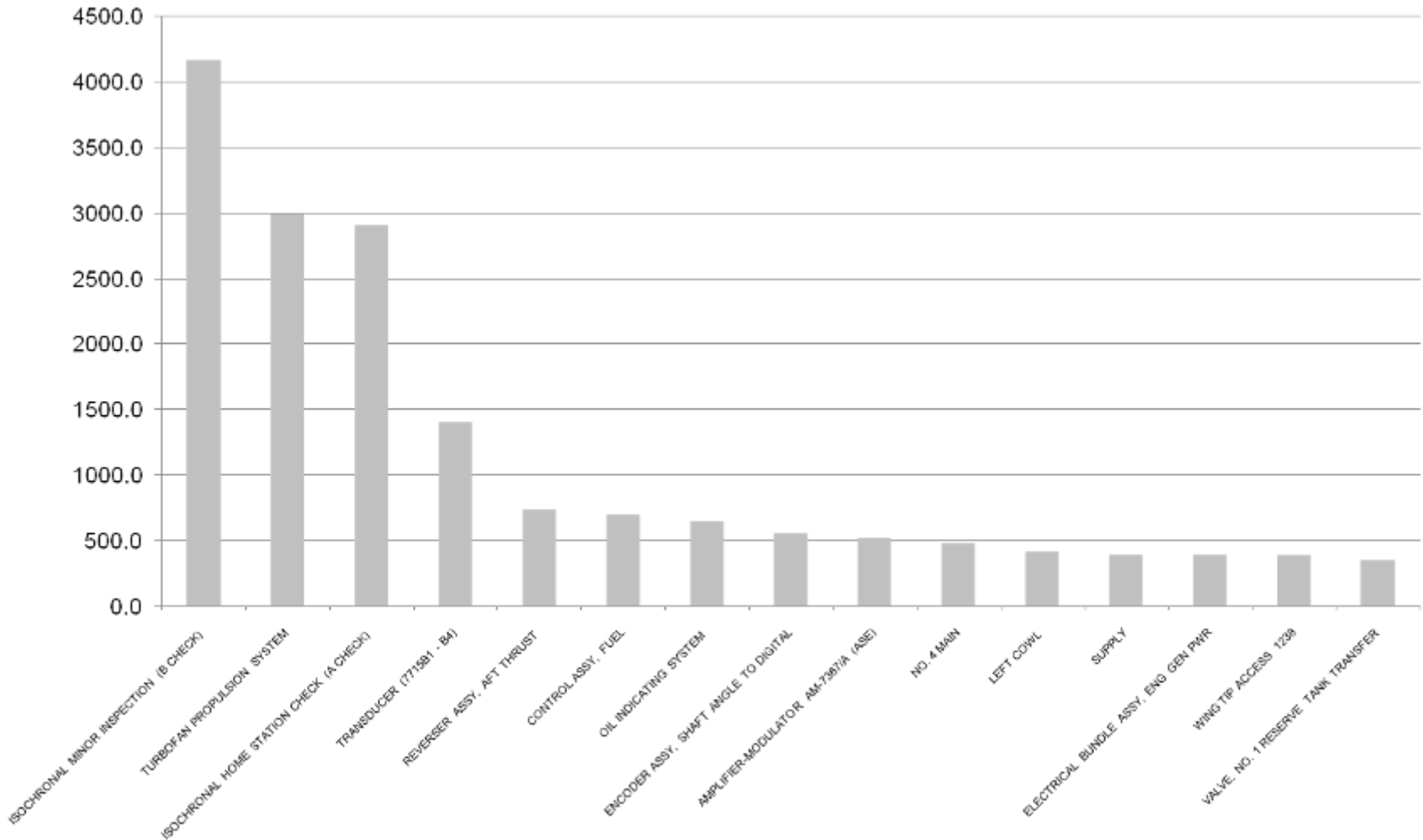


TNMCM 6-Month Drivers



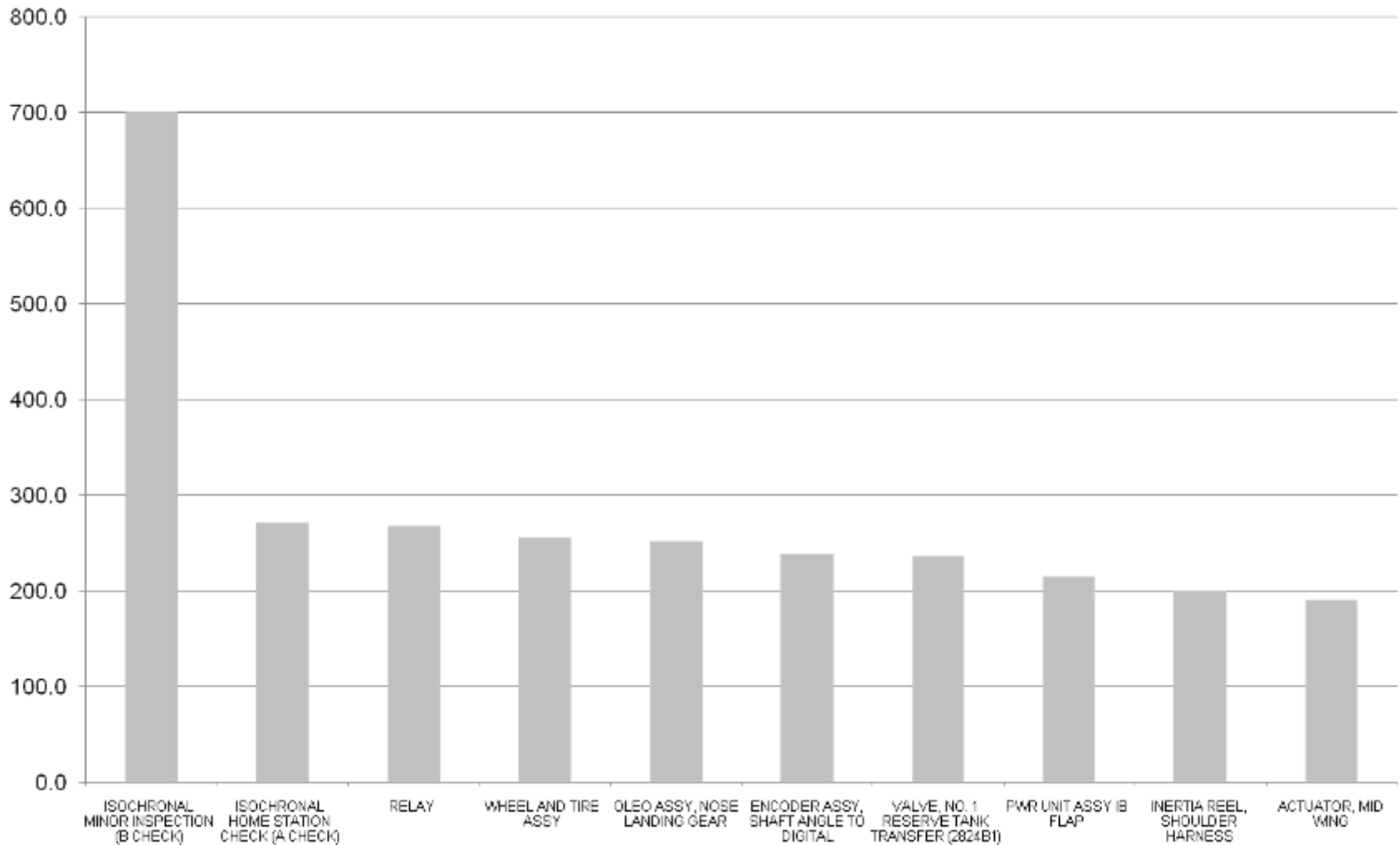


TNMCM 24-Month Drivers



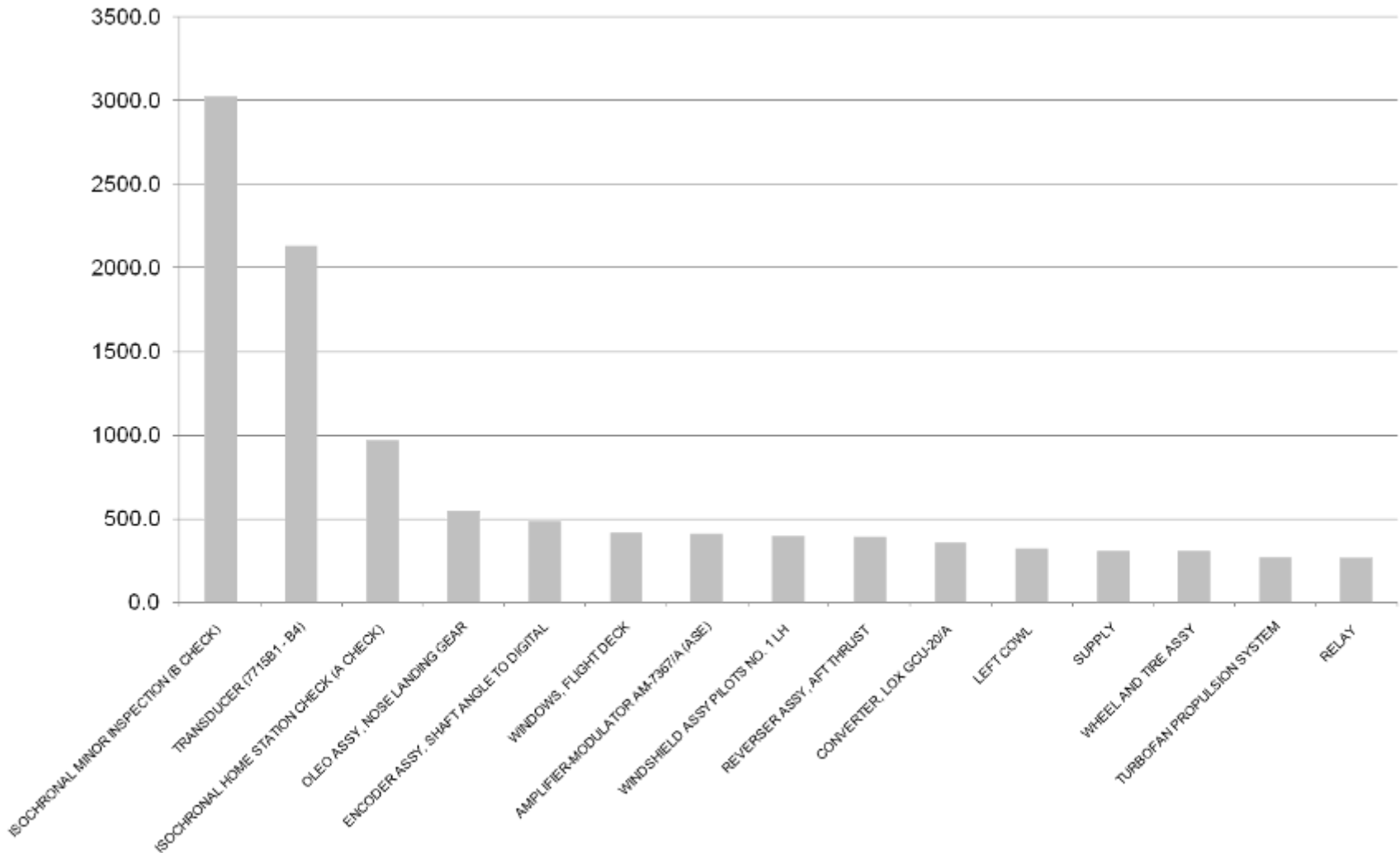


TNMCS 6-Month Drivers





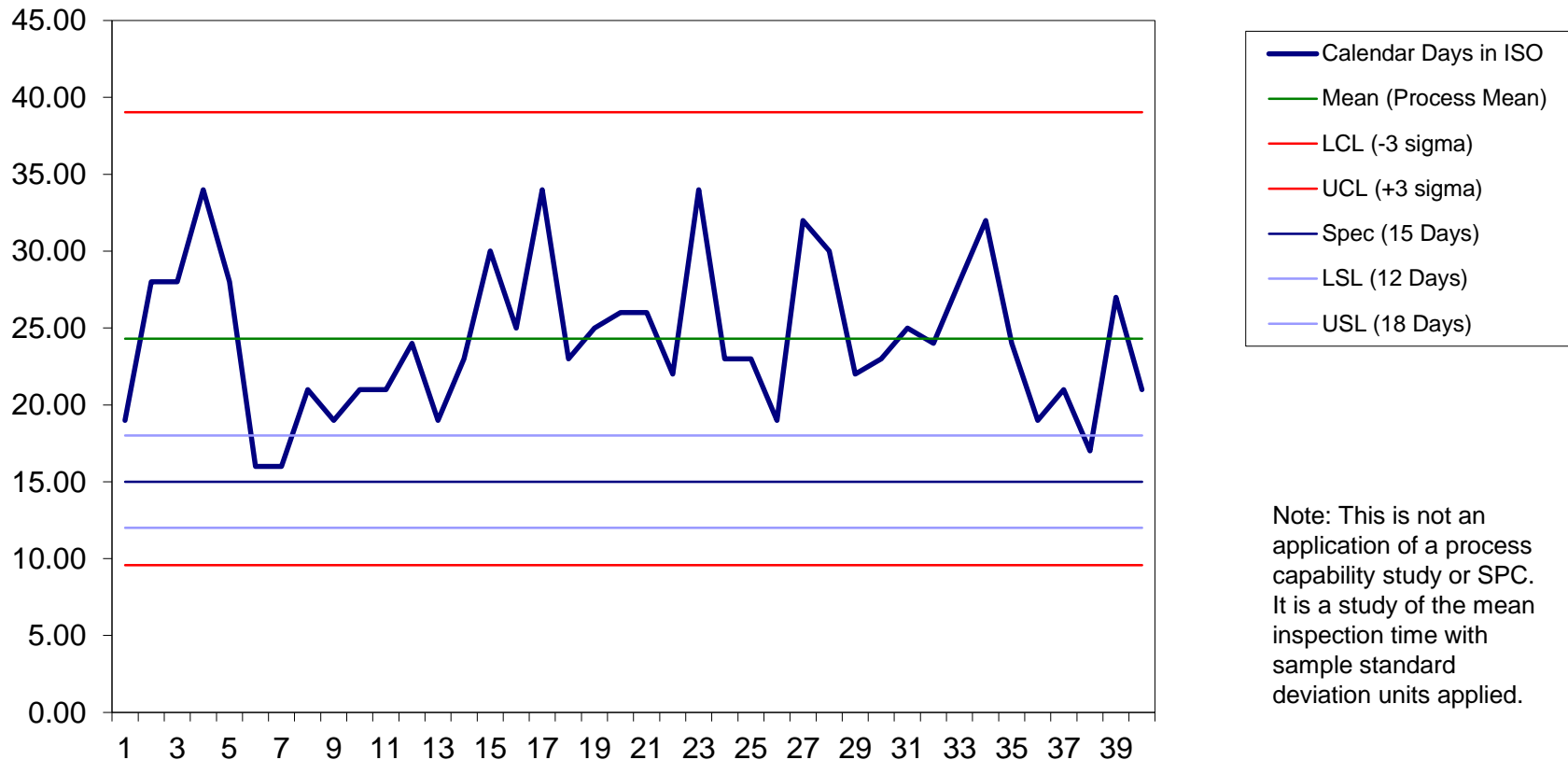
TNMCS 24-Month Drivers





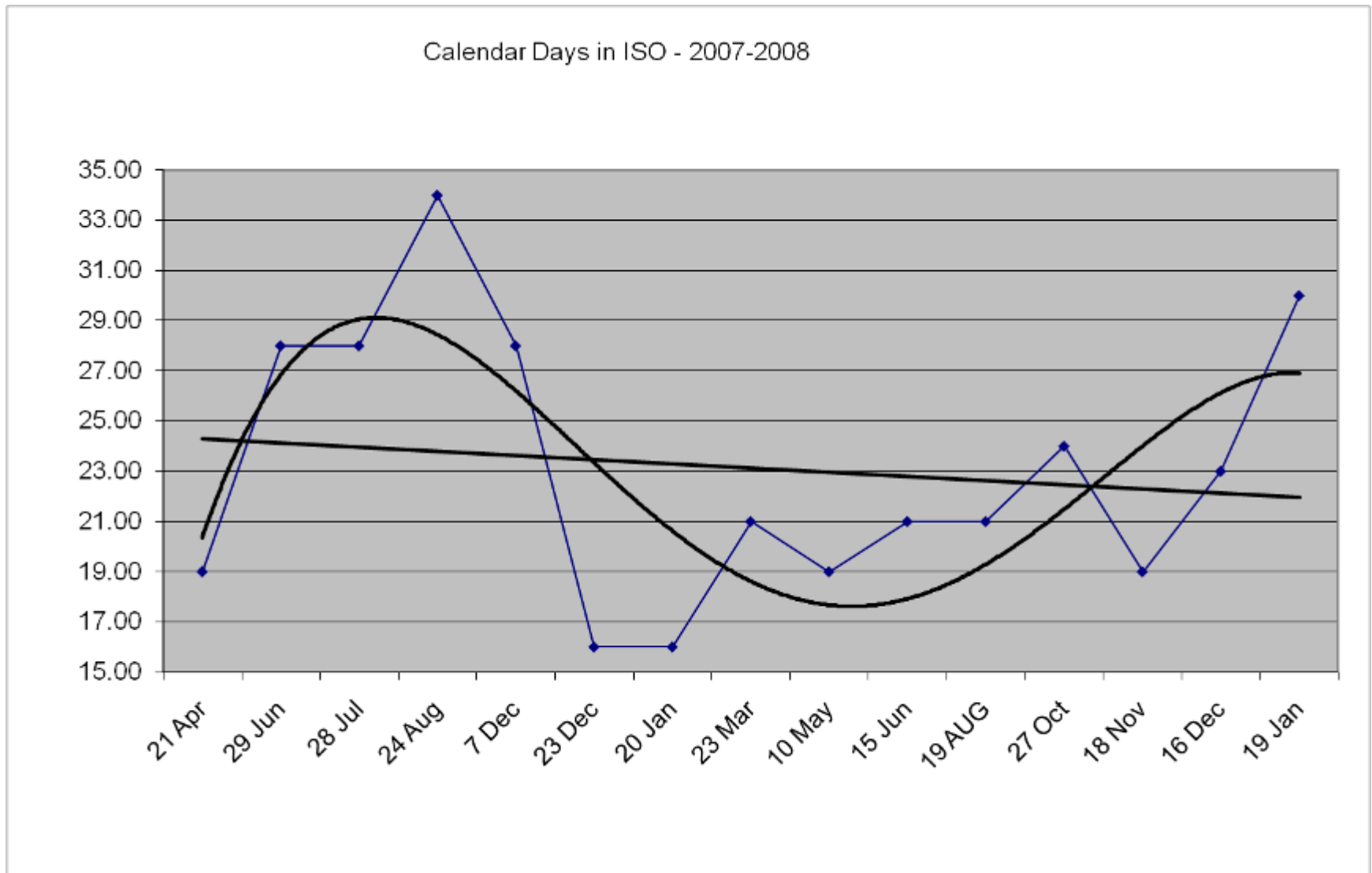
ISO Calendar Days - Notional Performance vs. Specification

ISO Calendar Days - Process Performance Mean Chart with Notional Specifications



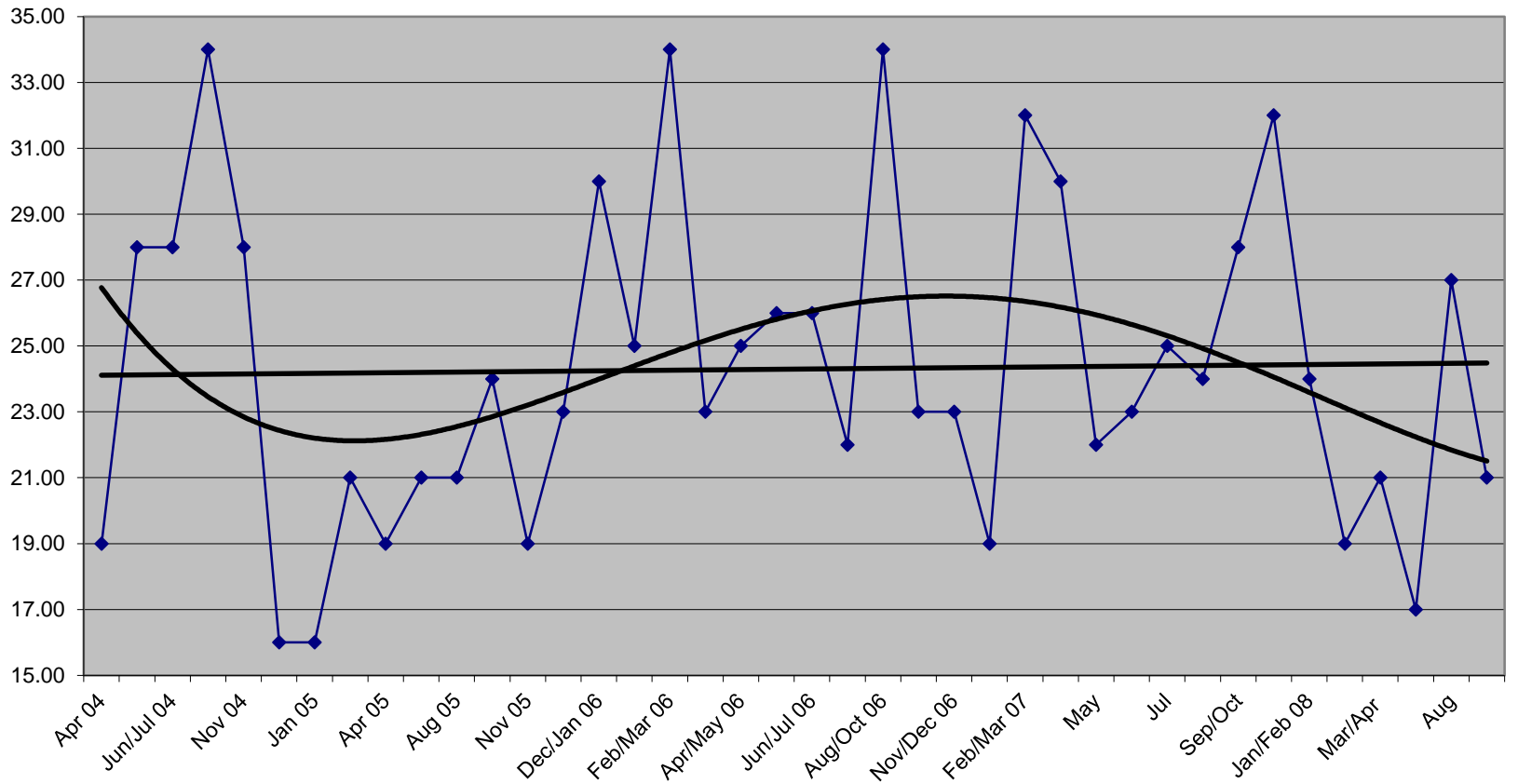


E-8 Calendar Days in ISO - 07-08





Calendar Days in ISO - 2004-2008





E-8 ISO Data (Apr 04 - Oct 08)

Calendar Days in ISO

Average is decreasing but is unacceptable	average	all	24.3
	average	2007-2008	26.11
	average	2008	21.50
Variation is decreasing but is unacceptable	st dev and variance	all	4.91
	st dev and variance	2007-2008	4.62
	st dev and variance	2008	3.56
Range is decreasing but is unacceptable	2006 rng	12	min all
	2007 rng	13	max all
	2008 rng	10	range all
Median is decreasing but is unacceptable	median	all	23.5
	median	2007-2008	25.00
	median	2008	21.00
Mode is decreasing but is unacceptable	mode	all	19
	mode	2007-2008	32
	mode	2008	21
	harmonic mean	all	23.36
	harmonic mean	2007-2008	25.37
	harmonic mean	2008	21.02
	(n) count of	all	40.00
	(n) count of	2007-2008	9.00
	(n) count of	2008	6.00

24.11
21.36
12.70

Number of Inspections	
2005	9
2006	10
2007	9
2008 (Jan-Sep)	6
Avg	9.3



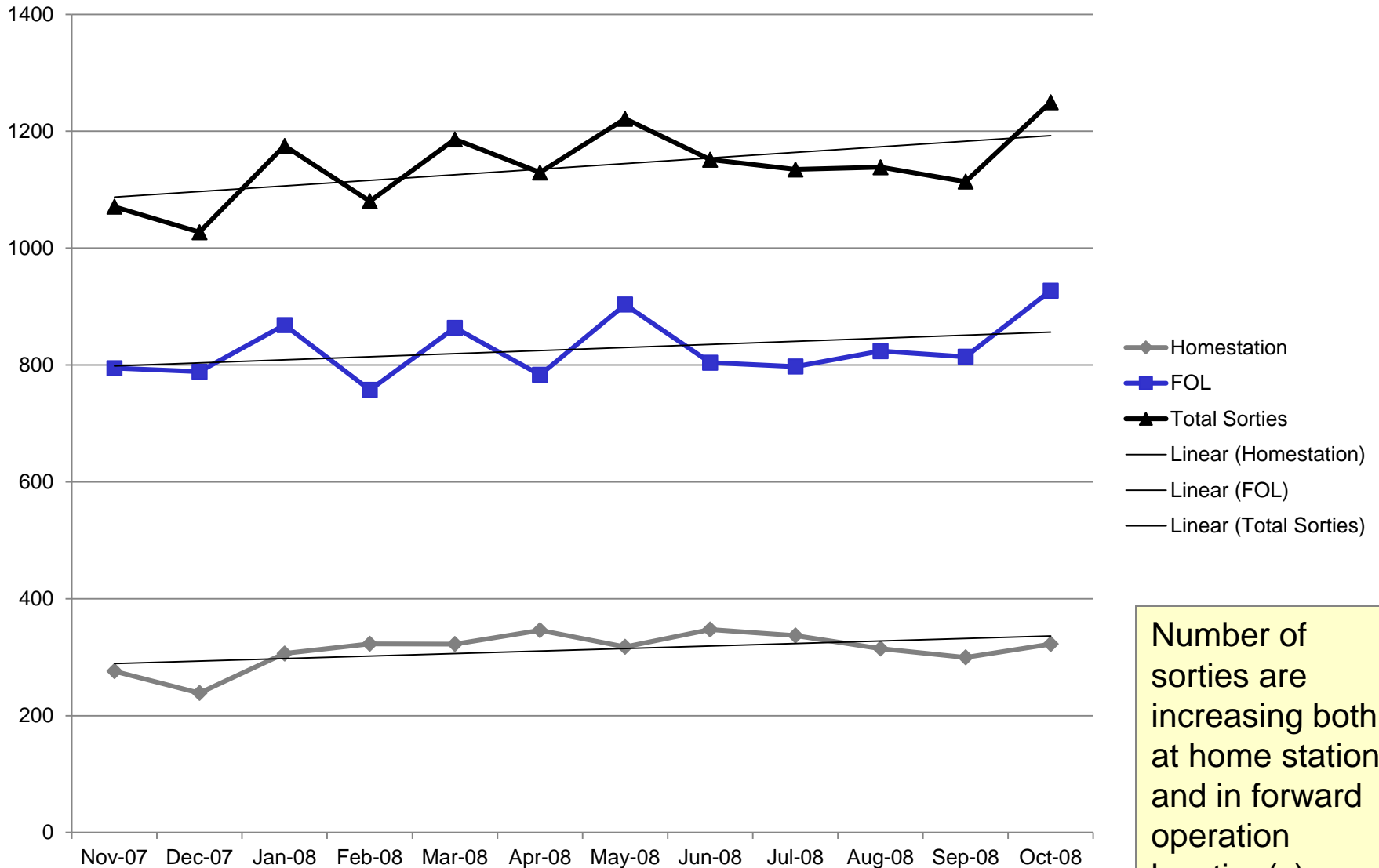
E-8 ISO Data (Apr 04 - Oct 08)

ISO Look Time vs. Fix Time

		Look	Fix	Fix/Look Ratio	
average	all	1271.76	1034.26	0.81	
average	2007-2008	1376.82	1648.98	1.20	
average	2008	1746.43	1526.10	0.87	
st dev and variance	all	415.98	645.37	1.55	2.41
st dev and variance	2007-2008	208.09	552.57	2.66	7.05
st dev and variance	2008	423.00	660.47	1.56	2.44
	min all	291.80	261.50	0.90	
	max all	2460.30	2644.90	1.08	
	range all	2168.50	2383.40	1.10	
median	all	1329.40	827.20	0.62	
median	2007-2008	1379.30	1425.00	1.03	
median	2008	1657.55	1575.05	0.95	
mode	all	#N/A	#N/A	#N/A	
mode	2007-2008	#N/A	#N/A	#N/A	
mode	2008	#N/A	#N/A	#N/A	
harmonic mean	all	1081.41	686.55	0.58	
harmonic mean	2007-2008	1349.15	1501.44	1.08	
harmonic mean	2008	1670.41	1227.36	0.66	
(n) count of	all	40.00	40.00	40.00	
(n) count of	2007-2008	9.00	9.00	9.00	
(n) count of	2008	6.00	6.00	6.00	



Number of Sorties (last 12 mos)



Number of sorties are increasing both at home station and in forward operation location(s)



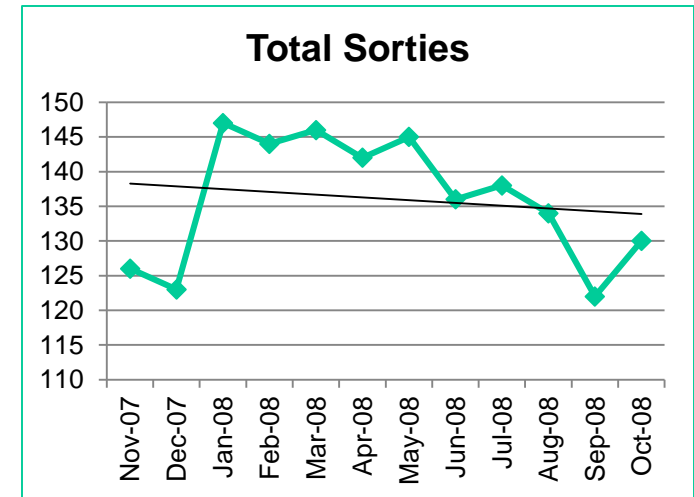
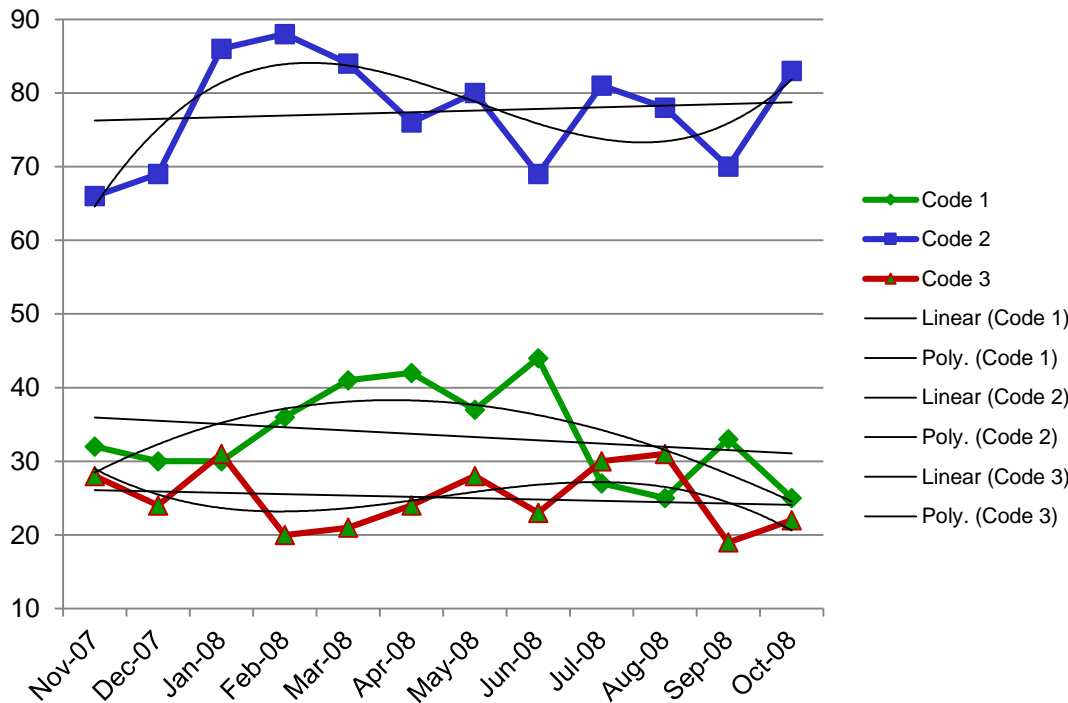
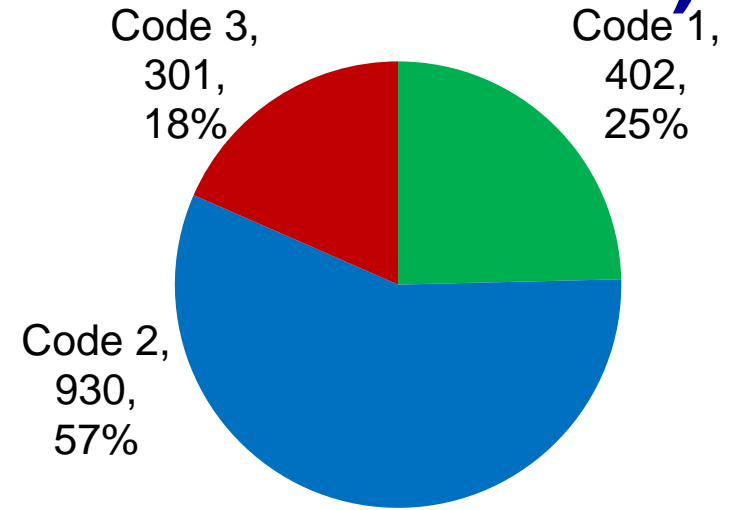
Code 1, 2, 3 Sorties (past 12 mos)

Over the past 12 months:

The aircraft flew Code 1 25% of the time,
Code 2 57% of the time,
and code 3 18% of the time

While number of sorties per month decreased

Code 1 Sorties have a negative trend (decreased)
Code 2 Sorties have an increasing trend (increased)
Code 3 Sorties have a decreasing trend (decreased)
(As sorties decreased, Code 2s increased)





Code 1, 2, 3 Data (past 12 mos)

	Code 1	Code 2	Code 3	Total Sorties
Oct-08	25	83	22	130
Sep-08	33	70	19	122
Aug-08	25	78	31	134
Jul-08	27	81	30	138
Jun-08	44	69	23	136
May-08	37	80	28	145
Apr-08	42	76	24	142
Mar-08	41	84	21	146
Feb-08	36	88	20	144
Jan-08	30	86	31	147
Dec-07	30	69	24	123
Nov-07	32	66	28	126
Total	402	930	301	1633

% of Total	24.6%	57.0%	18.4%	
mean	34	78	25	136
median	33	79	24	137
mode	25	69	31	#N/A
har mean	32.35	76.83	24.40	135.51
min	25	66	19	122
max	44	88	31	147
range	19	22	12	25
st dev	6.54	7.44	4.34	9.10



Charter - Approval/Roles

- **Lean Champion: Col Kevin Betz**
- **AFSO21 POCs:**
 - **ACC A9 AFSO21, Capt Joseph Bellucci**
 - **ACC A4 AFSO21, Lt Col Matthew Cox, Jeff Combs**
 - **116 Wg AFSO21, Major Renee Massey**
 - **116MXG/MXQI, SMSgt Anthony Tomczak**
- **Wing CC or Group CC: Brig Gen Thomas Moore**
- **Team Leader: Ken Hathaway, MSgt, 116MXS**
- **Facilitators:**
 - **Cox Matthew D LtCol ACC/A4/AFSO21**
 - **Combs Jeff L Ctr ACC/A4/AFSO21**
 - **Gary Durst, Capt, 116 LRS (trng obs)**
 - **John C Ace, MSgt, ACC/A4YA(A8YR)-C135 (trng obs)**
 - **Timothy Webster, MSgt, ACC/A4YA (SME)**



Charter - Event Description

- **Utilize Value Stream Analysis of ISO inspection process to reduce the time an aircraft is in ISO and eliminate non-value added tasks; without affecting the quality of the ISO inspection**



Charter

- **Problem Statement:**
- **The E-8 ISO process average needs to be reduced from an average of approximately 22 to 14 days, and the range of variation needs to be reduced from an approximate average of 9 days to 2 days (thus 14 +/- 2 days per ISO) with the same or better quality product as at present as measured by number of code 1, 2, and 3 sorties for the first 3 sorties after ISO, and by Ops mission effectiveness rates for the first 3 sorties after ISO.**



Charter

- **Purpose and need:**
- **Customer problems/concern:**



Charter

- **Current conditions:**
- **The E-8 ISO has consistently been the top TM and TS driver. While M, TM, and TS Rates all trending in the right direction, AA has a slight negative trend, and is not projected to meet the ops requirement according to HQ ACC and AFMC aircraft availability projections. By as early as 2010, E-8 aircraft availability will diminish significantly to -1 aircraft even after AFMC AA improvement initiatives. Over the past year, the numbers of sorties per month have been increasing both at home station and FOL. By decreasing the time in ISO between last flight before ISO to first flight after ISO, a potential aircraft availability improvement of as much as .25 may be realized.**



Charter

- **Impact if not pursued:**
- **Current condition has existed for:**
- **Business benefit:**



Charter - Boundaries

- **Start: Last flight before ISO**
- to -
- **Stop: First flight after ISO**
- **Detail: Focus is on the ISO process and critical path, however pre- and post-ISO scheduling and control is not out of bounds.**



Charter - Scope

- **Evaluate the ISO process from the last flight before ISO until the first after ISO including scheduling, supply function, MOCC, and scheduling of maintenance & AC sorties.**



Charter - Project Constraints

- **Time constraints: 4 days**
- **Other potential constraints:**
 - **Schedule (availability of personnel to operate the process after hours and on weekends and holidays, as well as priority associated with this effort as compared to other priorities)**
 - **Funding**
 - **Personnel (availability of personnel to operate the process after hours and on weekends and holidays)**
 - **Union rules / policy**
 - **Technology to be employed**
 - **Products/resources to be acquired (potential and related to technology, dependent upon future state)**
 - **Interfaces to other products/resources (potential formalization of working agreements and relationships central to establishing and maintaining an efficient process)**



Charter - Deliverables

- **Standardized 14-day ISO process**



Charter - Goals

- **Overarching goal and link to annual plan:**
- **Accomplishment ISO in 14 +/- 2 calendar days fly-to-fly with the same or better quality product as at present as measured by number of code 1, 2, and 3 sorties for the first 3 sorties after ISO, and by Ops mission effectiveness rates for the first 3 sorties after ISO.**

Aircraft Availability!
Same or better quality!



Return on Investment

- **Increased aircraft availability to support increased mission requirements**
- **Increased availability of MX personnel**
- **Improved communication with all involved maintainers**
- **Standardized ISO Process**
- **All members involved in a culture of continuous improvement**



Charter - Measures of Success

- **The overall metric is process flow time.**
 - **Specific metrics and internal-process metrics will be developed during the event.**

- **Measures to ensure improvements:**
 - **Aircraft availability**
 - **Fly-to-fly days**
 - **Aircraft status hours & rates**

- **Link back measures outlined in problem statement**
 - **Code 1 Sorties**
 - **First 3 Sorties after ISO**
 - **Mission Effectiveness**



Data Collection

- **# sorties (last 12 months, by month)**
- **# code 1, code 2, and code 3 sorties (last 12 months, by month)**
- **1st sortie after ISO code 1, code 2, and code 3 sorties for the last 12 months (or longer if not much trouble)**
- **Last 12 QAP briefings (assuming you have one each month)**
- **QA Results for the last 12 ISO inspections**
- **ISO dock controller flow plan**
- **ISO dock controller status sheet**
- **Two versions of the work cards, the word doc is a new version that will be released in NOV, the PDF file is what we currently are using.**



Team Members

MSgt Ken Hathaway
MSgt David Armour
TSgt Rich Wallace
TSgt Andre Barreto
TSgt Chris Cheek
MSgt Chris Carbajal
SSgt Duran
TSgt Earl Humphreys
TSgt Jeff Hertog
SSgt Ryan Edwards
TSgt Steve Stidfole
TSgt Chad Graham
TSgt Lisa Williams
MSgt Jed Miller
SSgt Owens
TSgt Baker
SSgt Routh
CMSgt Richard Patterson
TSgt Shaun Oneill
Lt Julian Thomas
SSgt Burr Cliprich
Major Brain McHenry

Team Lead

ISO

ISO

ISO

ISO

JETS

JETS

APG

IFC

Com/Nav

MOC

A/R

P&S

QA

E/E

S/M

HYDRO

Supervision

Union Rep

MXS Flight Commander

Radar

MXS/CD





E-8 ISO Event Process

Guidance and Charter



AFSO21 Training and Facilitation



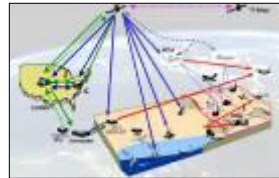
CPI and the Way Ahead



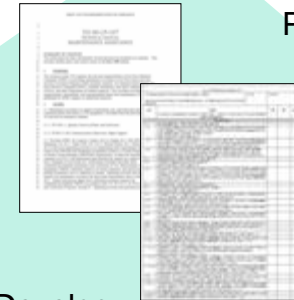
Review Previous Work



Warfighter Focus



Institutionalize the Process



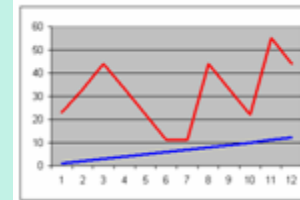
Build the Future State Map



Establish Standards of Performance

Future State table with columns for 'Current State' and 'Future State'.

Develop Measurements and Track Performance





Event Goal - In Short

- See the Value Stream
- Identify the Waste
- Make Improvements
- Establish Performance Standards
- Establish Measurements to Track Performance
- Institutionalize the Change

