Naval Air Systems Command Integrated In-Service Reliability Program (IISRP)

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Brief to the NDIA Systems Engineering Conference
San Diego, Ca.
25 October, 2005
Agenda

- Mission
- Vocabulary
- Overview
- IISRP Background
- IISRP & Cost Wise Readiness
- IISRP Process
- Results
- Examples
- Summary
SUPPORT THE WARFIGHTER BY IMPROVING RELIABILITY

“The nation needs a Navy that can provide homeland defense and be both forward *and* ready to surge forward with overwhelming and decisive combat power ... As leaders, we must create readiness from the resources given to us and recognize that readiness at any cost is not acceptable.”

ADM Vern Clark
Chief of Naval Operations
*CNO Guidance for 2004, Accelerating Our Advantages*
Vocabulary

- AERMIP – Aircraft Equipment Reliability and Maintainability Program
- AMSR – Aviation Maint. and Supply Report
- AVDLR – Aviation Depot Level Repairable
- BCM – Beyond Capability of Maintenance
- CA – Cost Avoidance
- DLA – Defense Logistics Agency
- FST – Fleet Support Team
- IISRP – Integrated In-Service Reliability Program
- MMH/FH – Maint. Man-Hour per Flight Hour
- NAVICP – Naval Inventory Control Point
- PMA – Program Manager Air
- ROI – Return on Investment
- TOW – Time on Wing
Overview

• NAVAIR Integrated In-Service Reliability Program
  – A means to sustain aging weapon systems components while controlling operations and maintenance costs
  – An integral element of NAVAIR’s global strategy to meet the Chief of Naval Operation’s readiness and cost objectives
• A key component of Cost Wise Readiness
IISRP Background

- AMSR report identified poor AVDLR component reliability as a major cost driver
- NAVAIR BPR 3-3: Component Reliability Improvement Project initiated 1st qtr FY99
  - AIR-6.0 (Industrial) leadership, TYCOMs, NAVICP, AIR-3.0/4.0 (Logistics/Engineering) participation
  - Integrated teams in work at 3 depot sites since 1999
- Transitioned to an institutionalized program May 2002
  - AIR 6.0/4.0/3.0 (Industrial/Engineering/Logistics) Team
Focus mainly on high value AVDLRs:
- Identify poor performers
- Optimize support practices
- Balance increased reliability vs. cost

Objectives
- Improve component reliability
  - increase TOW by enhancing fielded reliability
- Reduce Weapon System life-cycle costs
  - reduce component demand, lower MMH/FH, optimize O/I/D capabilities, increase readiness
Involves all stakeholders:
- Fleet O- and I-Level Maintainers
- PMA/FSTs
- Depot Managers and Artisans
- NAVICP and DLA

Every aspect of support scrutinized

“Fix” recommendations linked to root cause analysis

Implementation assistance and tracking
IISRP & Cost Wise Readiness

- Analyzes components worked in organic depots
  - Primary focus on improving process effectiveness
  - Achieve goals by maximizing component Time on Wing (TOW)
  - Ensure support processes restore component resistance to failure
IISRP Process
**IISRP Process**

**Key enablers:**
- Stakeholder buy-in
- Integrated systems and tools
- Training and expertise

**Cost Wise Readiness**
# IISRP Process

## PHASE THREE
- **INSTITUTIONALIZED CAPABILITIES**
- **PERFORMANCE BASED INDUSTRIAL FOCUS**
- **FORMAL LIFE CYCLE MODELING**

## PHASE TWO
- **EXPANDED FOCUS TO DESIGN / PERFORMANCE**
- **EXPANDED KNOWLEDGE OF FAILURE MODE / MECHANISM**
- **BEGIN FORMAL MODELING**

## PHASE ONE
- **TARGET TOP COST DRIVERS**
- **REACH INHERENT RELIABILITY**
- **INDUSTRIAL PROCESS FOCUS**

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<th><strong>Lo-tech</strong></th>
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<td><strong>Select</strong></td>
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<td>Automated trigger tools using SNTS (w/failure modes and depot data)</td>
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<td>Automated trigger tools using SNTS (w/failure modes and depot data)</td>
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<td><strong>Analyze</strong></td>
<td>Capability to partially perform with high manual effort</td>
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<td>Capability exists to perform fully</td>
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<td><strong>Fix</strong></td>
<td>Design/operation change based on partial data</td>
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<td><strong>Measure</strong></td>
<td>Manually combined reports</td>
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<td>Process change</td>
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<td>Adherence to proper procedure</td>
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**Where we are...**
Results
Results as of 3rd Qtr FY05

- Delivered 257 Reliability Studies
  - 110 Components studied from the AFAST Top 500 AVDLR Cost Driver List
- Other Sources include AMSR, OI, FST, IWST, others
- Generated 1383 Actions

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<td>External to Depot</td>
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<td>TOTALS</td>
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*Combined = Actions with both Internal and External requirements.
Studies by Platform

Total Number of Studies: 257

- F18: 26.46%
- H-3: 0.39%
- H-46: 7.00%
- H53: 6.23%
- P3: 3.50%
- S3: 0.39%
- T-45: 0.78%
- Other: 0.39%
- C-130: 0.39%
- AV8: 5.06%
- Common: 6.23%
- E2 C2: 9.73%
- EA6B: 9.34%
- F14: 9.73%

- Total Number of Studies: 257
Actions By Category

Documentation/Processing (805) 58%

Packaging / Preservation / Handling / Shipping & Transportation (88) 6%

Quality (49) 4%

Safety (8) 1%

Tools and Support Equipment (111) 8%

Other (36) 3%

Material (200) 14%

Manpower/Training (58) 4%

Facilities (28) 2%

Total Number of Studies: 257
Improvement Takes Time

Effective Reliability Investments Reverse or Slow Cost Growth.. Over Time

**Notional Ideal Improvement**

- Instantaneous Implementation
- Implementation by Attrition

**Real World Improvement**

- Function of support decisions

*AVDRL $/ FH*$

$0 100 200 300$

Fiscal Year

1 2 3 4 5 6 7 8 9 10

$FISCAL YEAR$

$NOTIONAL RATE OF COST GROWTH$

$AVDRL $/ FH$ TY*$

$1,500 1,700 1,900 2,100 2,300 2,500 2,700 2,900 3,100 3,300$

$FISCAL YEAR$
Measuring Results

- It takes time to see initial results
- ROI grows over time
Examples

- The following studies were completed by local IISRP Teams at the Naval Air Depots.
- These IISRP Teams coordinated with local FSTs, Fleet Maintainers, Depot production managers, and artisans to complete the analyses.
F/A-18 Horizontal Servo-cylinder

• Drivers:
  – Ranked number 20 on AMSR List of Top 100 AVDLR Cost Drivers
  – High on NAVICP 350/360 and Opportunity Index Reports
  – In CY98, 922 BCMs
  – From 1994 to 1999, BCM/kFH rate increased 486%

• Findings/Actions:
  – Majority of D-level repairs involve leaking/replacing seals
    • Developed engineering change to replace dynamic seals
    • Issued LES directing 100% replacement of seals in manifold and valve assembly if compromised seals or rings are discovered
    • Reactivated Hydraulic Action Team to train Fleet and reduce unnecessary removals
  – On Servo-cylinders inducted into depot, 50% of the Electro-Hydraulic Servo Valves had failed
    • LES issued requiring 100% inspection of EHSV Shuttle Spool
    • Implemented heating and cooling cycling during testing
• Results/Impact:
  
  – BCM/kFH rate decreased by 21% from existing trend since 3Q FY00
  
  – Additional BCM reduction expected after new seals are installed
F/A-18 Horizontal Servo-cylinder

NI001 Horizontal Stabilizer Servocylinder
BCMs Per 1K Actual Flight Hours

Values


Legend
Actuals
Do-Nothing
Lower Bound
Upper Bound

Data
FY QTR BCMs FHs Removals AV/DR L F
FY QTR BCM FH REM AV/DR L F

Comments
Comments will appear here.

Data as of July 06/2005

BCM/kFH
F/A-18 Horizontal Servo-cylinder

NI001 Horizontal Stabilizer Servocylinder
Time On Wing

Values

Legend
Actuals
Do-Nothing
Lower Bound
Upper Bound

Data
FY QTR BCMs FHs Removals AVDLR CUP
FY QTR BCM FH REM AVDLR CUP
Comments
Comments will appear here.

Data as of Jul/08/2005
P-3 Engine Driven Compressor

- **Driver(s):**
  - Ranked number 30 on the AMSR degrader list
  - In FY99 there were 141 EDC BCMs

- **Findings/Actions:**
  - **Findings:**
    - SM&R code in the O-level pubs was incorrect and did not reflect the maintenance plan
  - **Action:**
    - FST issued guidance to fleet to send EDC’s to specialized Intermediate Maintenance locations
P-3 Engine Driven Compressor

• Results/Benefits:
  – BCM/kFH rate decreased by 40% from existing trend since 1Q FY01
  – TOW increased by over 50% from existing trend since 4Q FY02
P-3 Engine Driven Compressor

JX005 Engine Driven Compressor
PN (206400-7-1) NIIN (01-296-0834) Platforms (P-3C)
BCMs Per 1K Actual Flight Hours

Legend
- Actuals
- Do-Nothing
- Lower Bound
- Upper Bound

Data
- FY
- QTR
- BCMs
- FMs
- Removals
- AVDLR
- CUP

Comments
Comments will appear here.

Data as of: July 27, 2005
P-3 Engine Driven Compressor
AV-8B Stab Servo-cylinder

- **Drivers:**
  - First prototype IISRP candidate
  - In CY98, 114 BCMs
  - From 1994 to 1999, BCM/kFH rate increased 215%

- **Findings/Actions:**
  - Initially, majority of D-level repairs involve leaking/replacing seals
    - MCR released identifying wedge-pack seals from Shamban Aerospace as preferable substitute. Total of 8 seals per units were impacted
  - “A/C” pickoff testing procedures were inaccurate
    - Procedures corrected and 26 AWP units were retested, made RFI and placed back into supply
  - Sustainment review revealed new failure mode: SAAHS-6 failures (electrical)
    - IISRP sponsored OEM site visit, which revealed modifications not being performed at depot level. Noted modification addressed electrical discrepancies
AV-8B Stab Servo-cylinder

• Results/Impact:
  – Resolved immediate readiness issue
  – Avoided a planned buy of new servo-cylinders
  – BCM//kFH rate decreased by 55% from existing trend since 2Q FY00
AV-8B Stab Servo-cylinder

BCM/kFH
AV-8B Stab Servo-cylinder

CP991 SERVO CYLINDER
PN (3629H2) NIIN (011723653) Platforms (AV-8B)
Time On Wing

Legend
Actuals
Do-Nothing
Lower Bound
Upper Bound

Data
FY QTR BCMs FHs Removals AVDLR CUP
FY QTR BCM FH REM AVDLR CUP
Comments
Comments will appear here.

Data as of Jul/28/2006
Summary

- **IISRP**
  - is a key element of Cost Wise Readiness
  - is a credible process
  - has demonstrated results:
    - BCM Rates - reducing or slowing the increase
    - TOW - improving or holding steady
  - continues to work with all stakeholders to improve readiness and control cost
Back ups
F404-400 Low Pressure Turbine Rotor

**Long Term Results/Benefits:**
- BCM/kFH rate decreased by 34% from existing trend since 3rd quarter FY01
- TOW increased by 44% from existing trend since 3rd quarter FY01

**Immediate Impact:**
Near immediate arrestment in increasing BCM trend

**Solution:**
- Added precision measurement tooling to I-level
- Provided O-level training on proper FH computation method
E-2/C-2 Propeller

Solution:
Added automated foam pouring capability at depot

Immediate impact:
RFI’ed 85 blades vice scrapping due to foam damage

Long Term Results/Benefits:
- BCM/kFH rate decreased by 21% from existing trend since 1Q FY03
- Significant Cost Avoidance since implementation of study actions.