IISRP
INTEGRATED IN-SERVICE RELIABILITY PROGRAM

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

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IISRP
INTEGRATED IN-SERVICE RELIABILITY PROGRAM

Agenda

- Mission
- Vocabulary
- Overview
- IISRP Background
- IISRP & Cost Wise Readiness
- IISRP Process
- Results
- Examples
- Summary

Mission

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

IISRP & Cost Wise Readiness

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

IISRP & Cost Wise 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

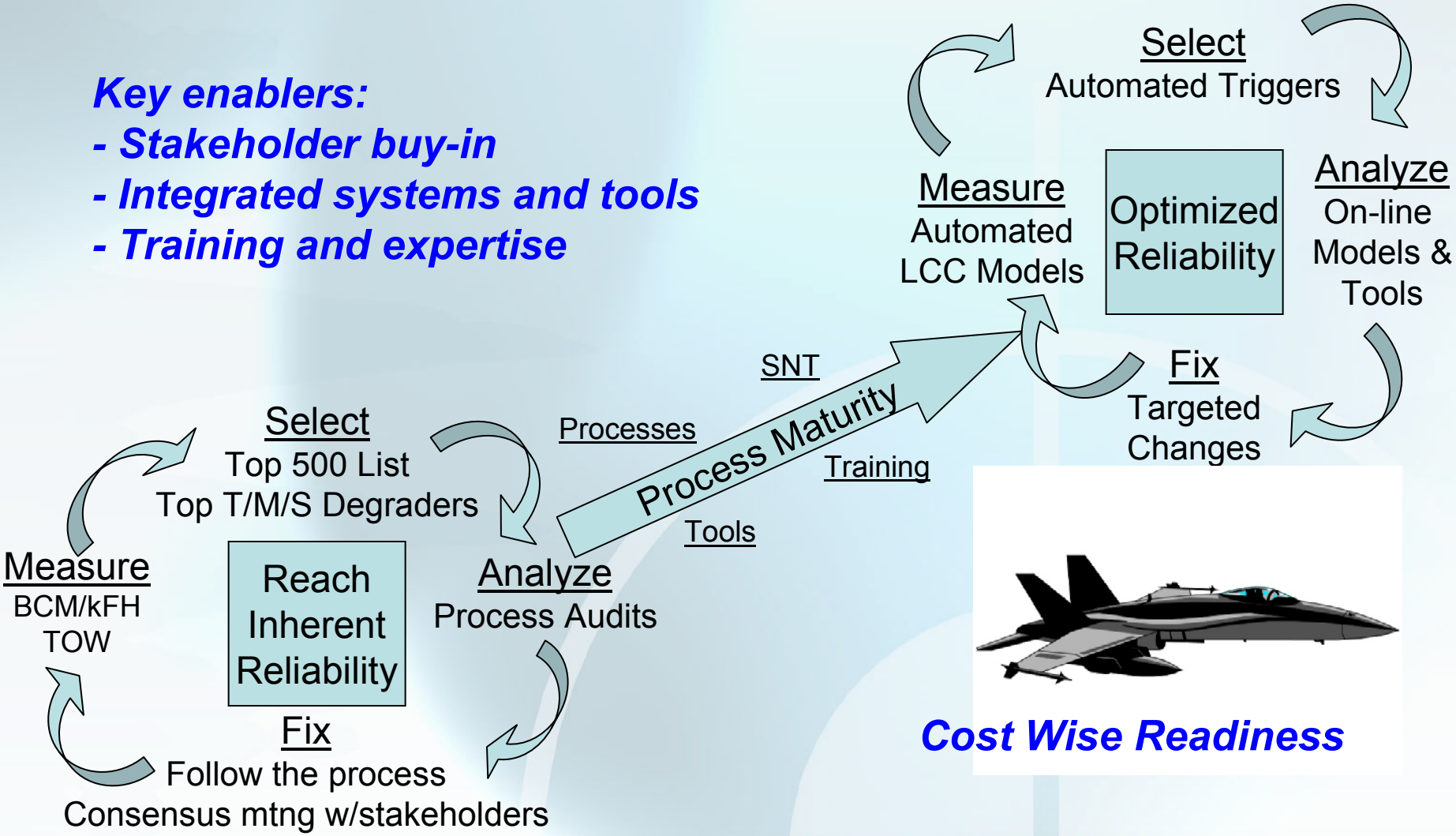
IISRP & Cost Wise Readiness

- 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

Where we are…

	Select	Analyze	Fix	Measure
Hi-tech	Capability pending enabling tools and processes: SNT, depot data, etc.	Automated trigger tools using SNTS (w/failure modes and depot data)	Formal statistical reliability modeling tools: Weibull, NHPP, Laplace	Design/operation change based on complete reliability analysis	Automated LCC/ reliability measurements using predictive techniques
		LMDSS/ CMIS analysis			
	Capability to partially perform with high manual effort	3M/NALDA analysis/SRC w/manual links to failure modes	FMEA/FTAs (depends on program) Rogue Analysis	Design/operation change based on partial data	Manually combined reports
Lo-tech	Capability exists to perform fully	Summary listings (AMSR/Top 10s)	Process walk through	Process change	
		Informal discussion with depot/fleet		Adherence to proper procedure	

Results

Results as of 3rd Qtr FY05

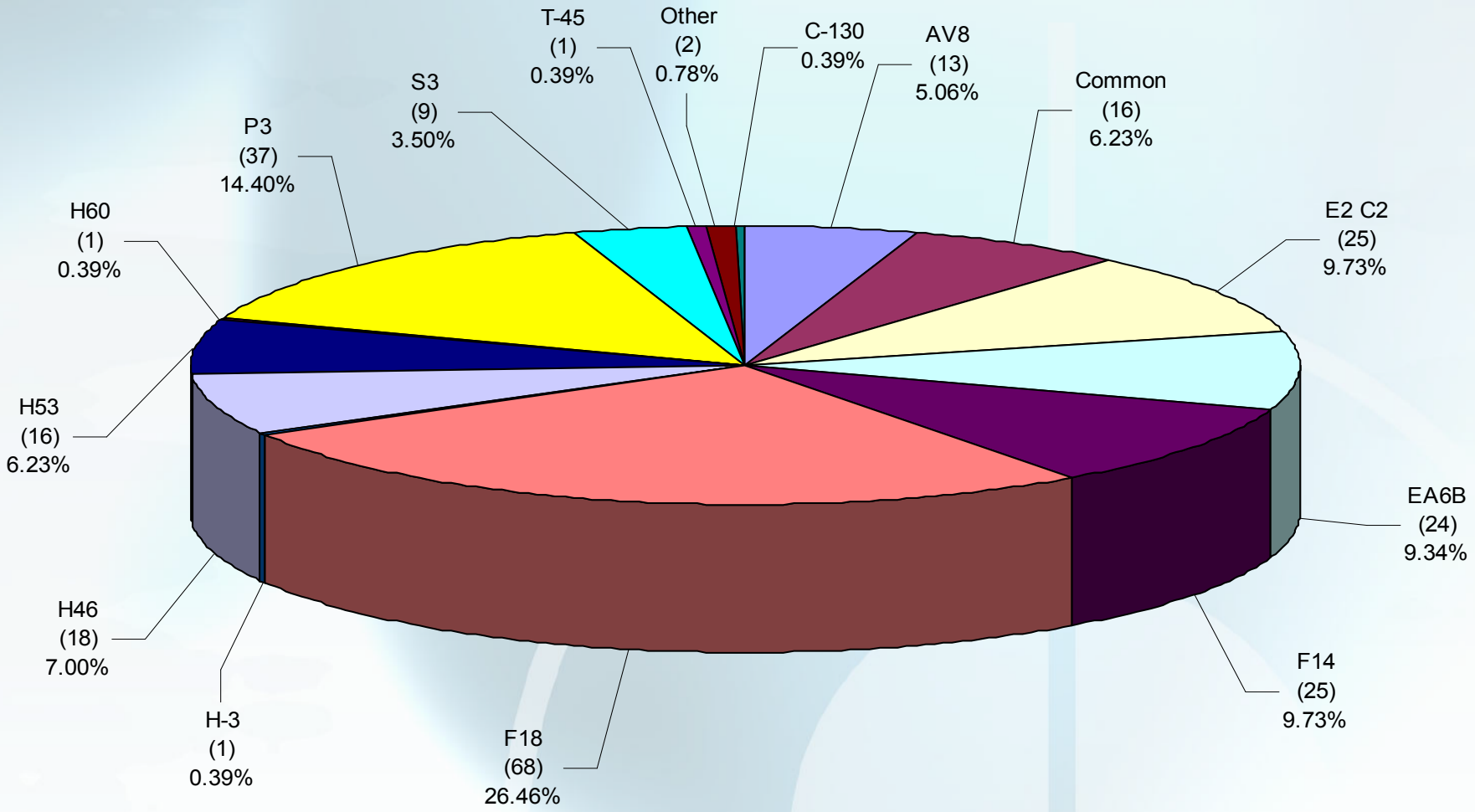
- Delivered 257 Reliability Studies
  - 110 Components studied from the AFAST Top 500 AVDLR Cost Driver List
- Other Sources include
  AMSR, OI, FST, IWST, others
- Generated 1383 Actions

Action Funding		
	Total #	Funded #
Internal to Depot	1307	1292
External to Depot	70	53
*Combined	6	6
TOTALS	**1383**	**1351**

*Combined = Actions with both Internal and External requirements.

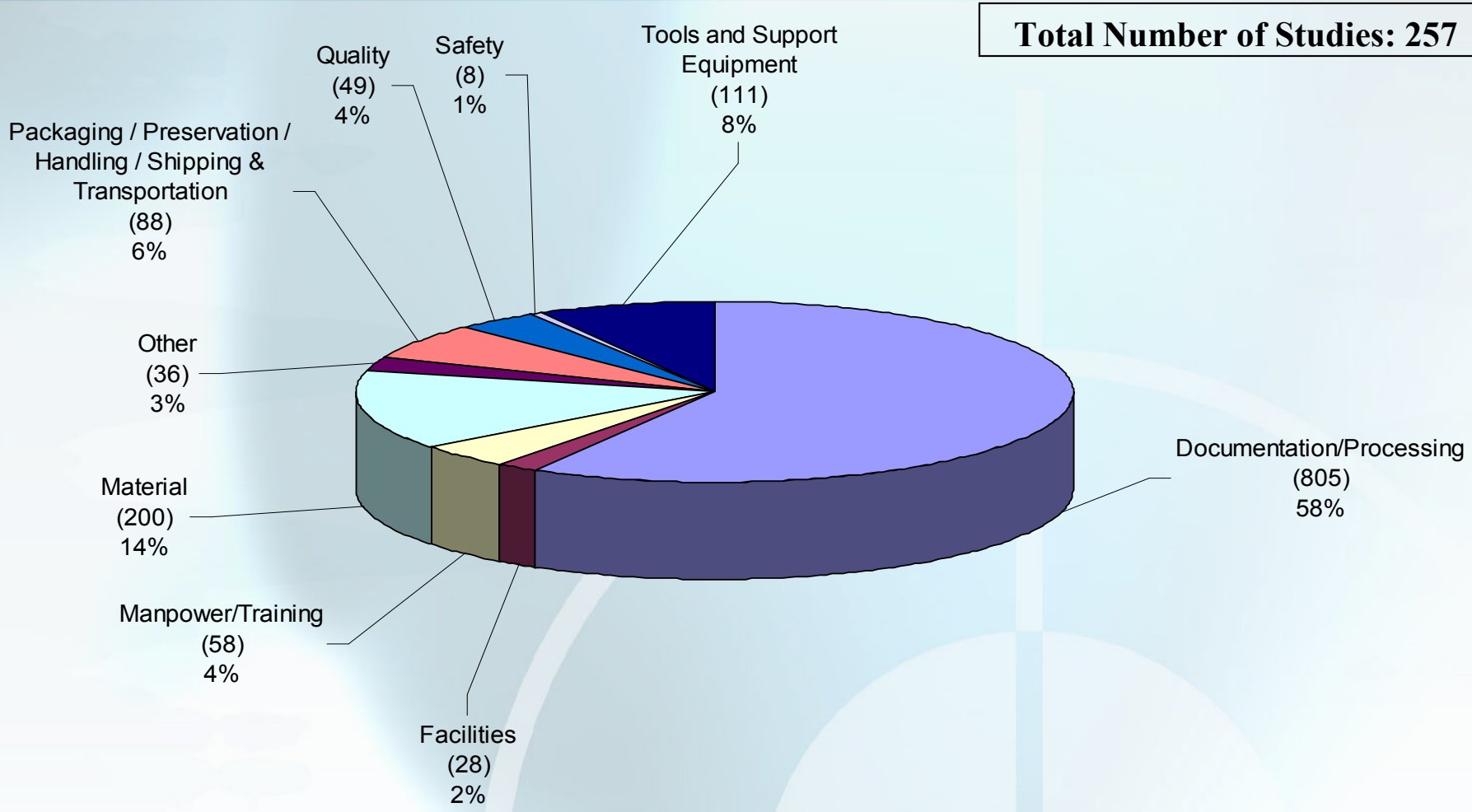
Studies by Platform

Total Number of Studies: 257



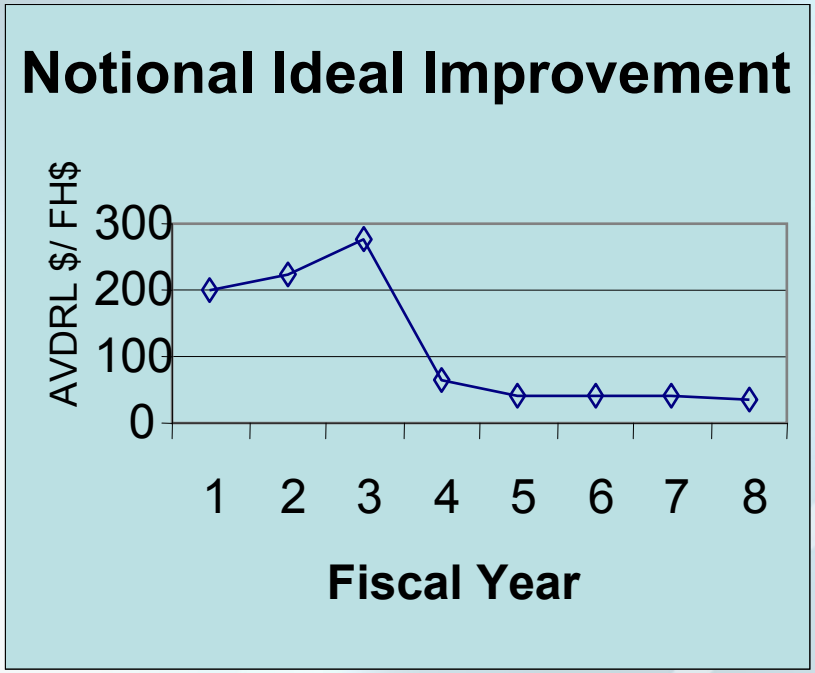
Actions By Category

Total Number of Studies: 257

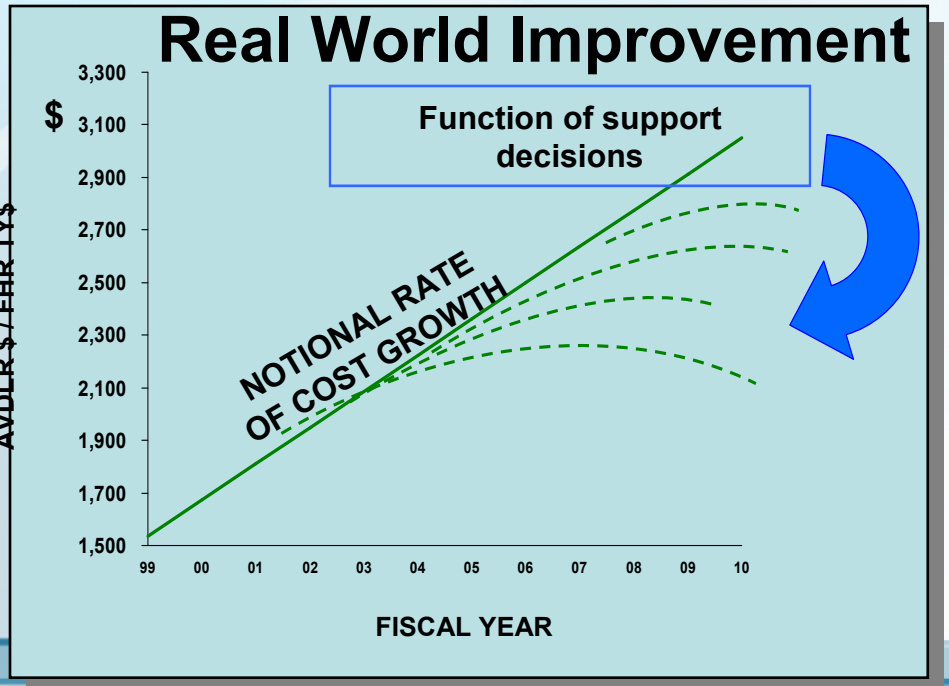


Improvement Takes Time

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

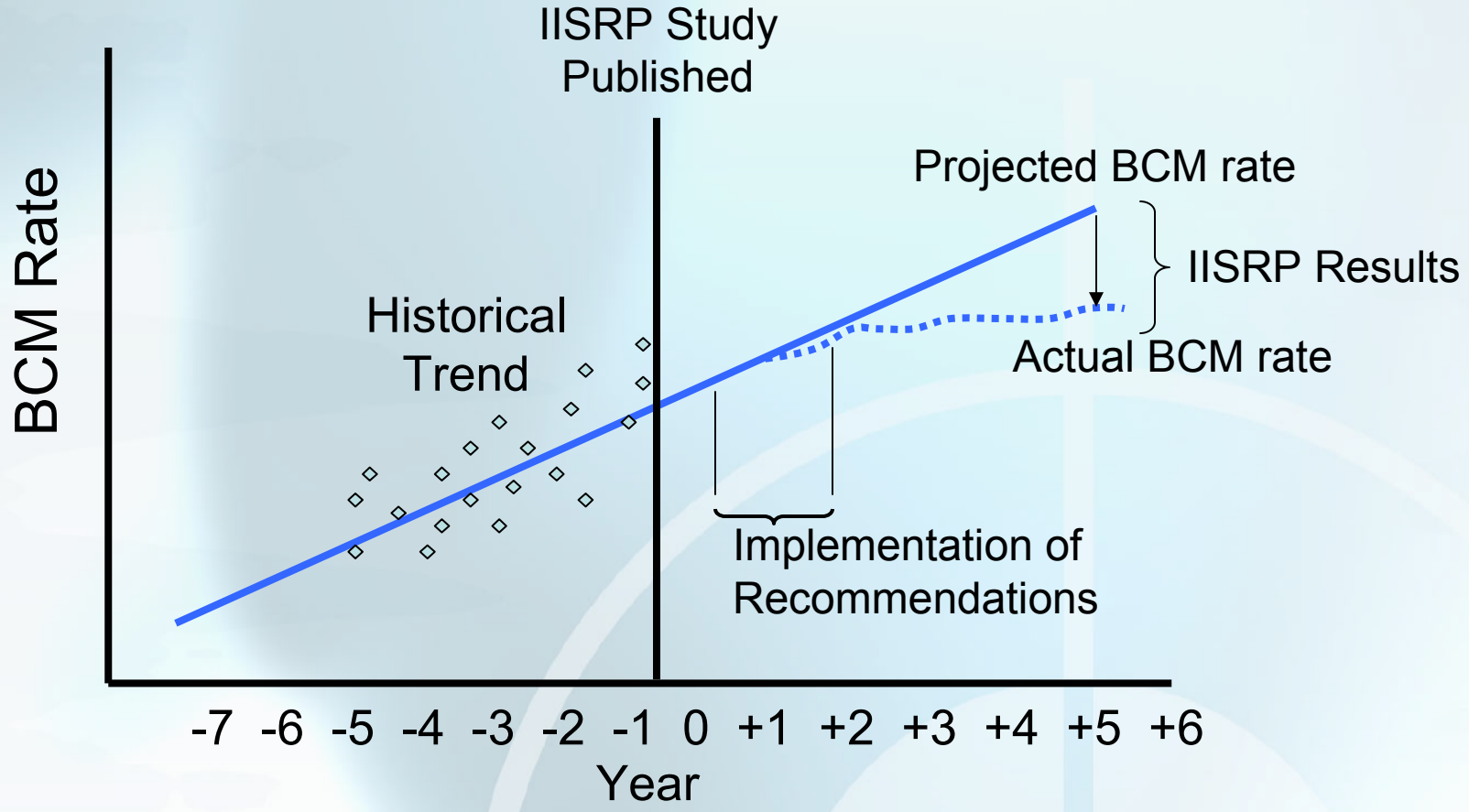


Instantaneous Implementation



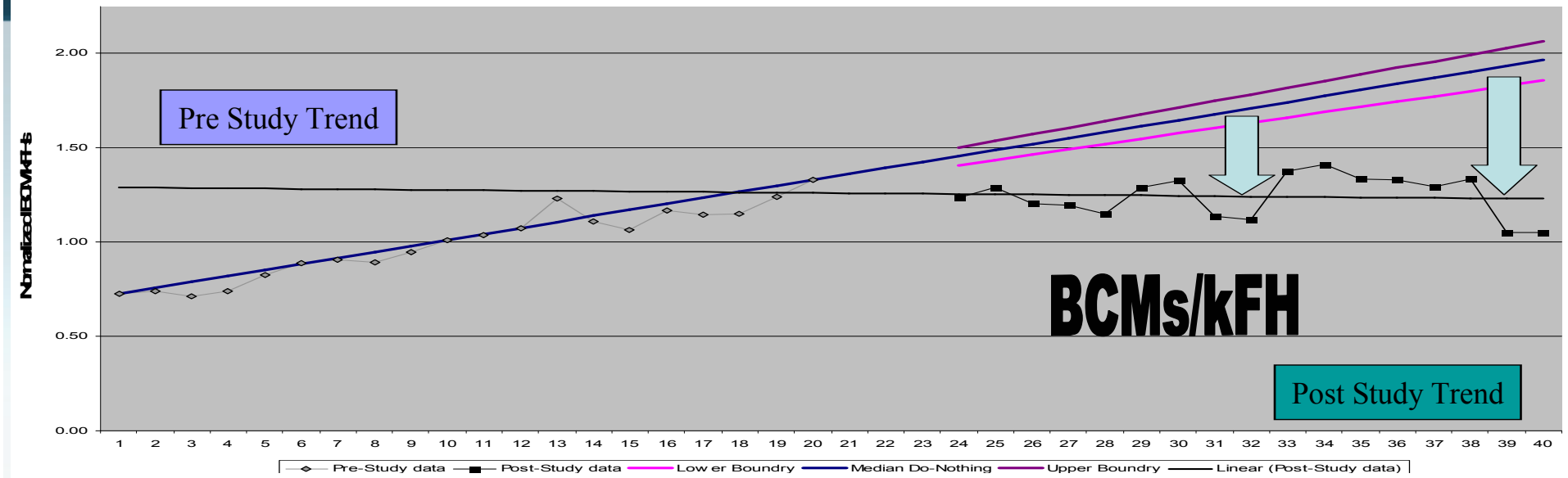
Implementation by Attrition

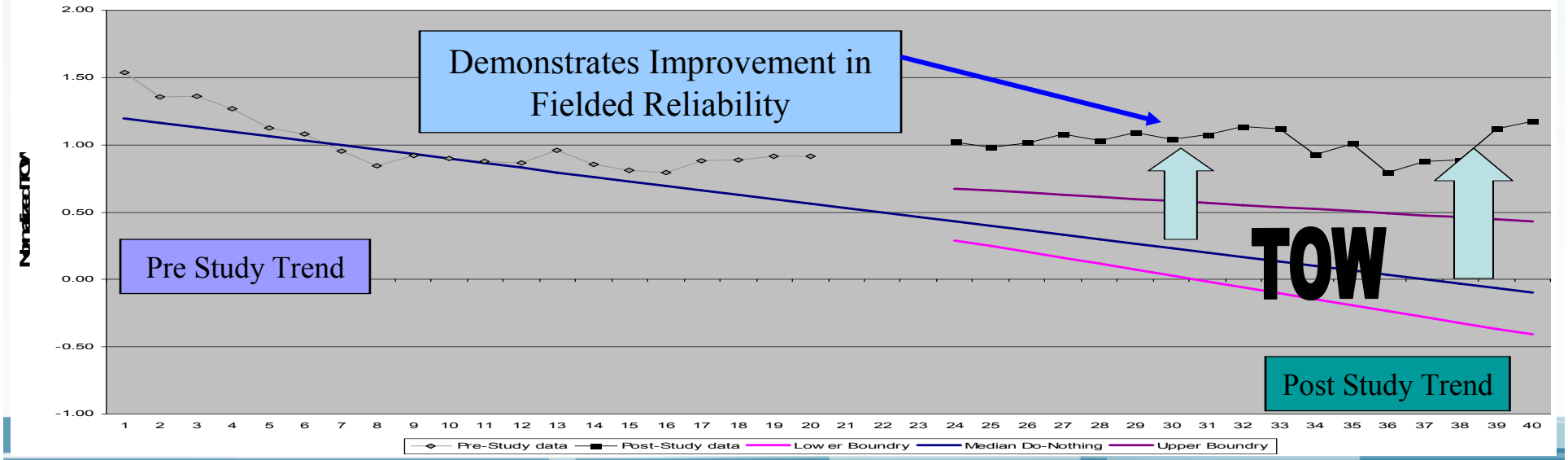
Measuring Results



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

Turning The Tide





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

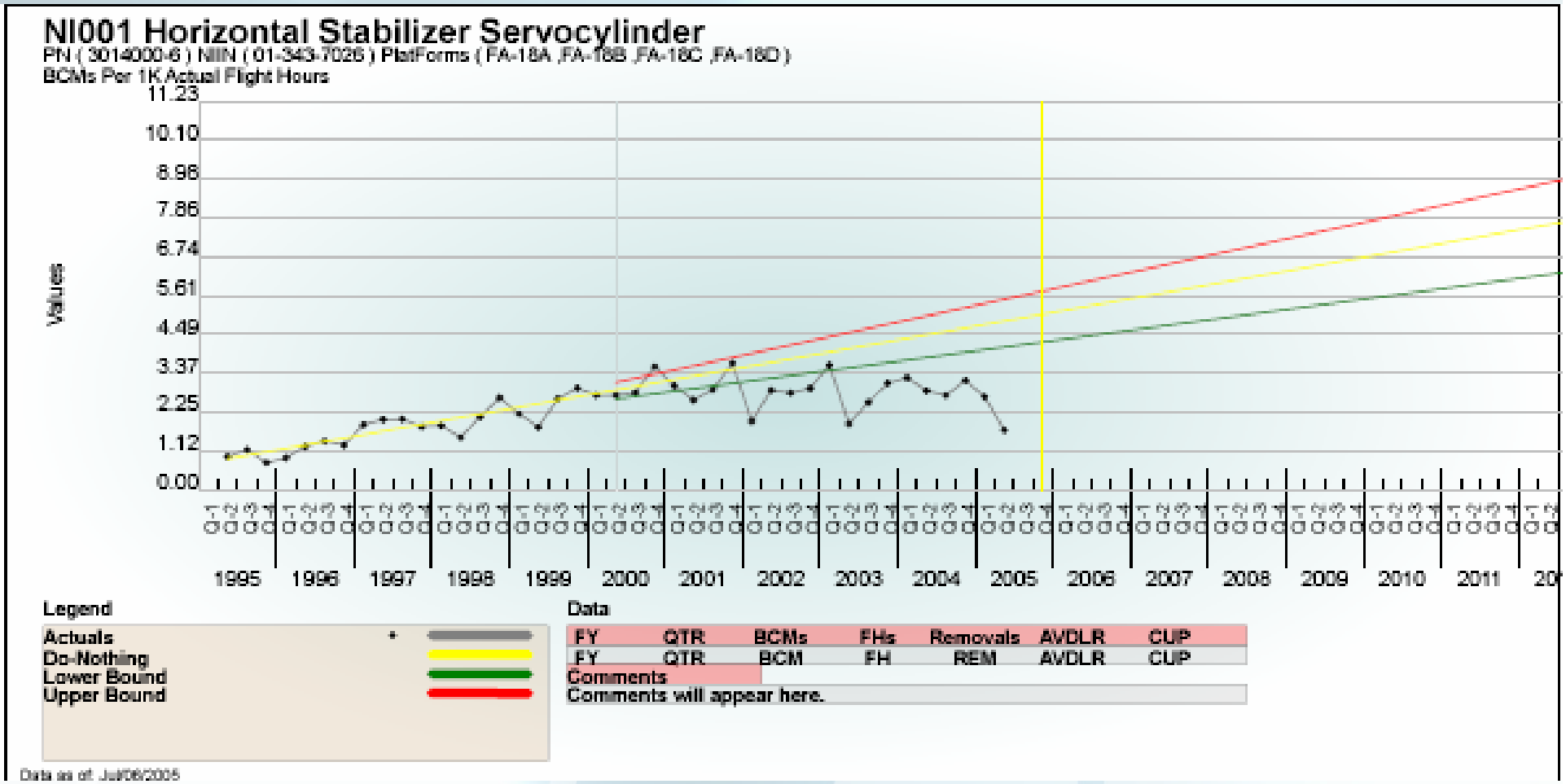
F/A-18 Horizontal Servo-cylinder

- **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

F/A-18 Horizontal Servo-cylinder

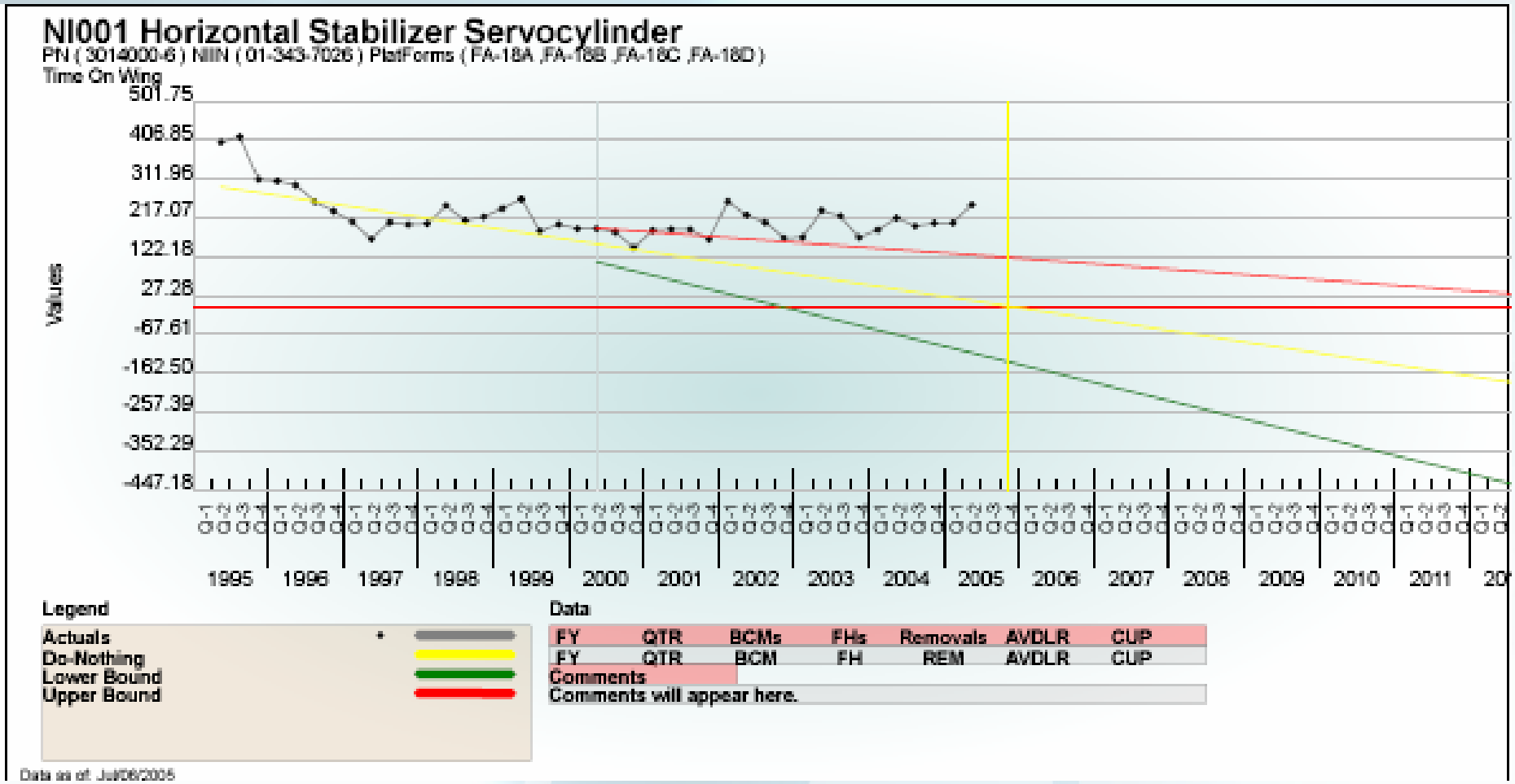
- **Results/Impact:**
  - **BCM/kFH rate decreased by 21% from existing trend since 3Q FY00**
  - **Additional BCM reduction expected after new seals are installed**

F/A-18 Horizontal Servo-cylinder



BCM/kFH

F/A-18 Horizontal Servo-cylinder



TOW

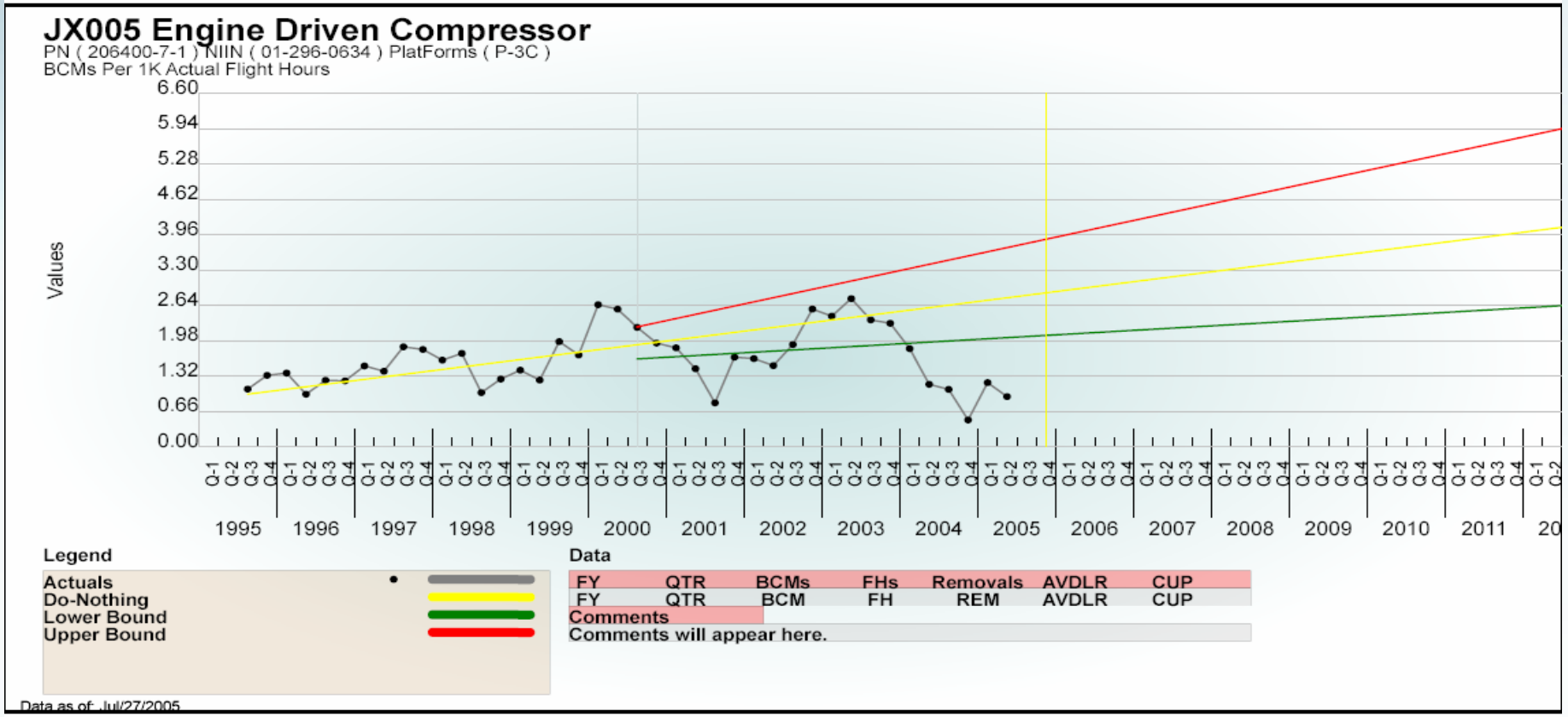
P-3 Engine Driven Compressor

- **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

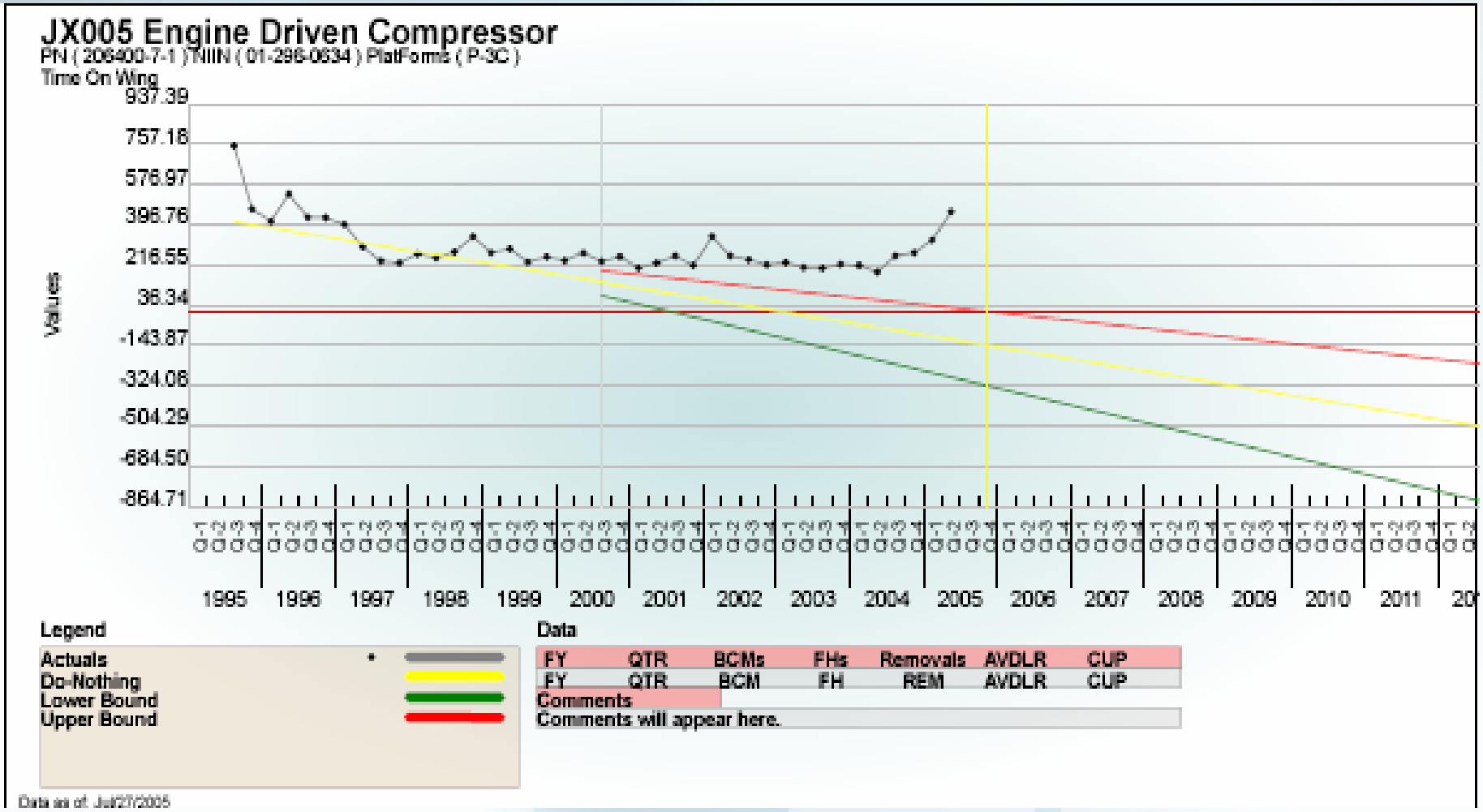
- **Results/Benefits:**
  - **BCM/kFH rate decreased by 40% from existing trend since 1Q FY01**
  - **TOW increased by over 50% from existing trend since 4Q FY02**

P-3 Engine Driven Compressor



BCM/kFH

P-3 Engine Driven Compressor



TOW

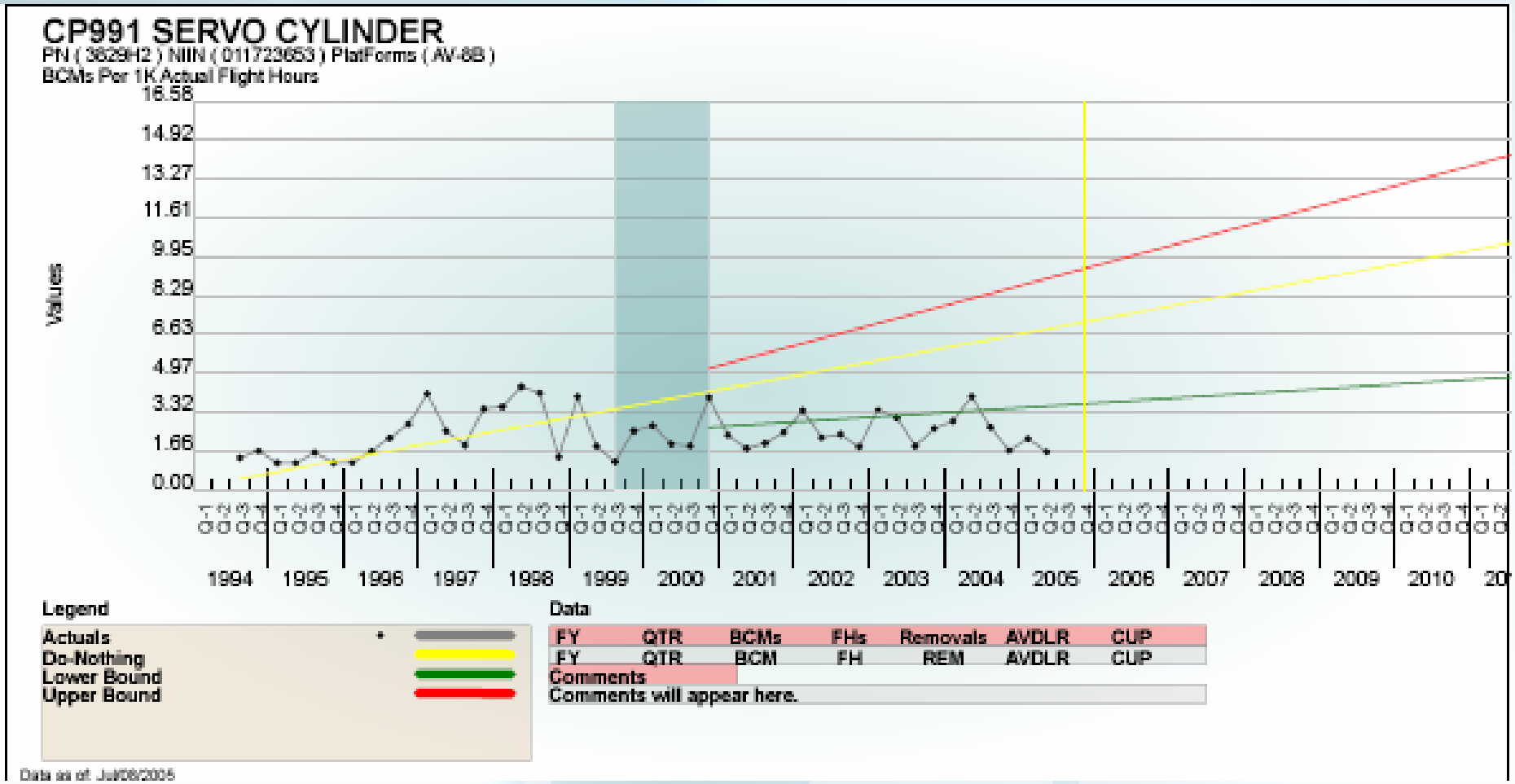
AV-8B Stab Servo-cylinder

- **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

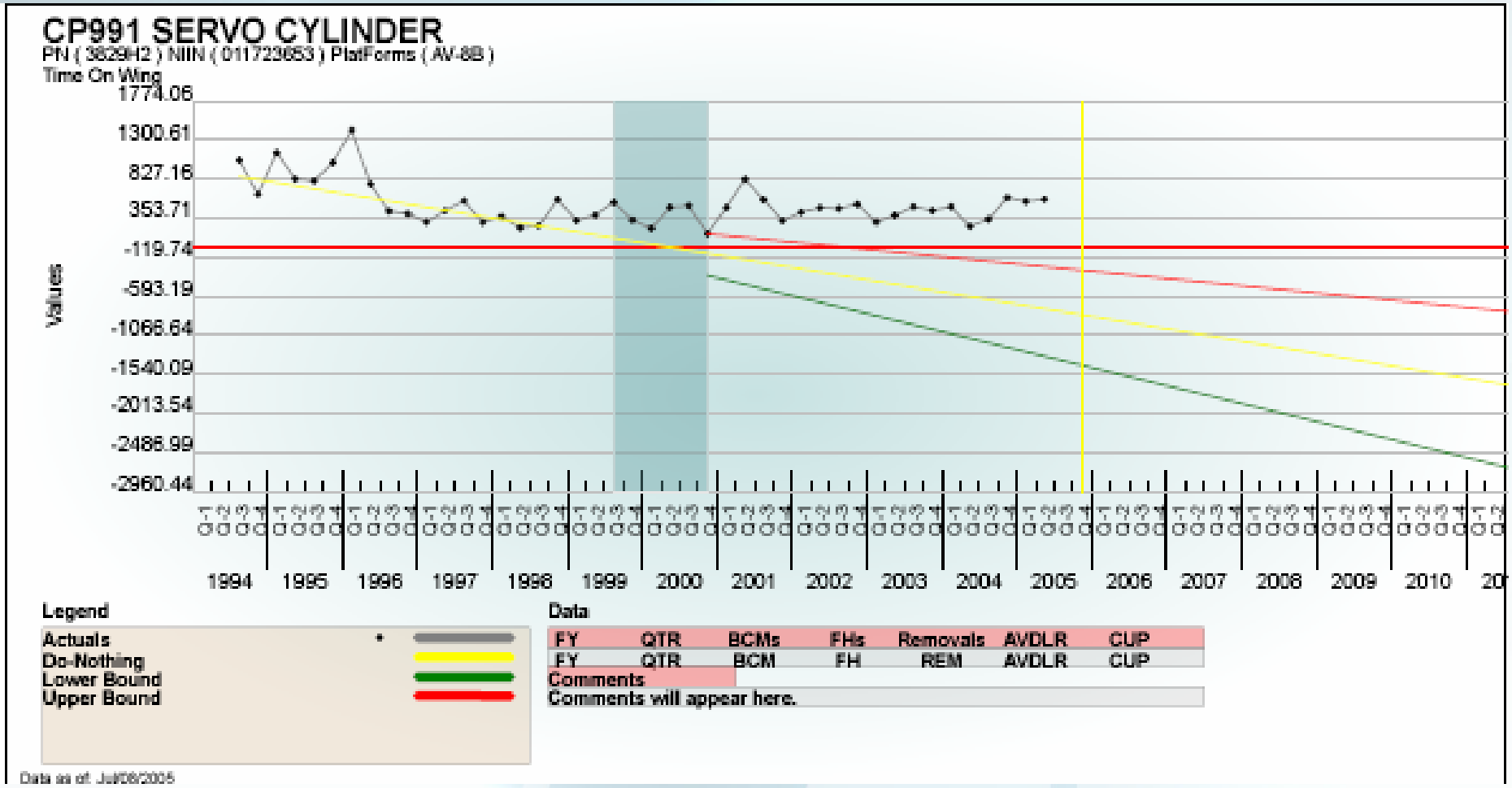
- **Results/Impact:**
  - **Resolved immediate readiness issue**
  - **Avoided a planned buy of new servo-cylinders**
  - **BCM//kFH rate decreased by 55% from existing trend since 2Q FY00**

AV-8B Stab Servo-cylinder



BCM/kFH

AV-8B Stab Servo-cylinder



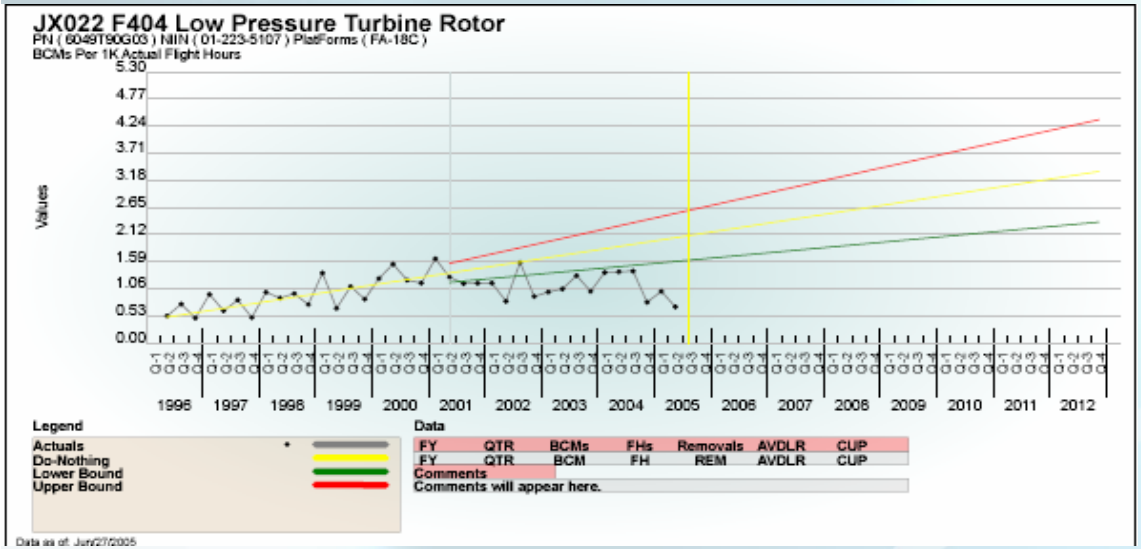
TOW

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**

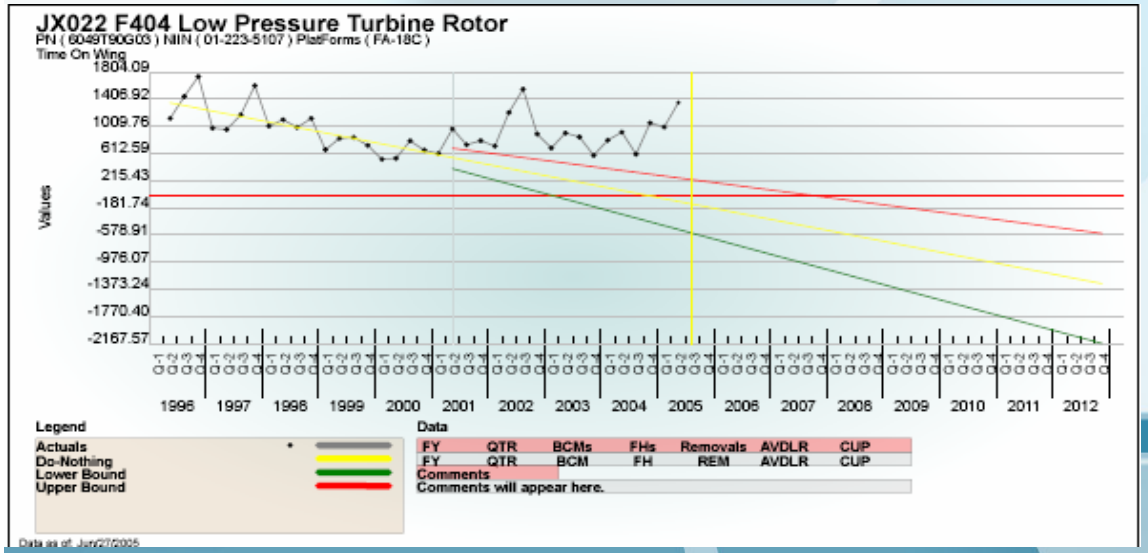
Back ups

F404-400 Low Pressure Turbine Rotor



Solution:
Added precision measurement tooling to I-level
Provided O-level training on proper FH computation method

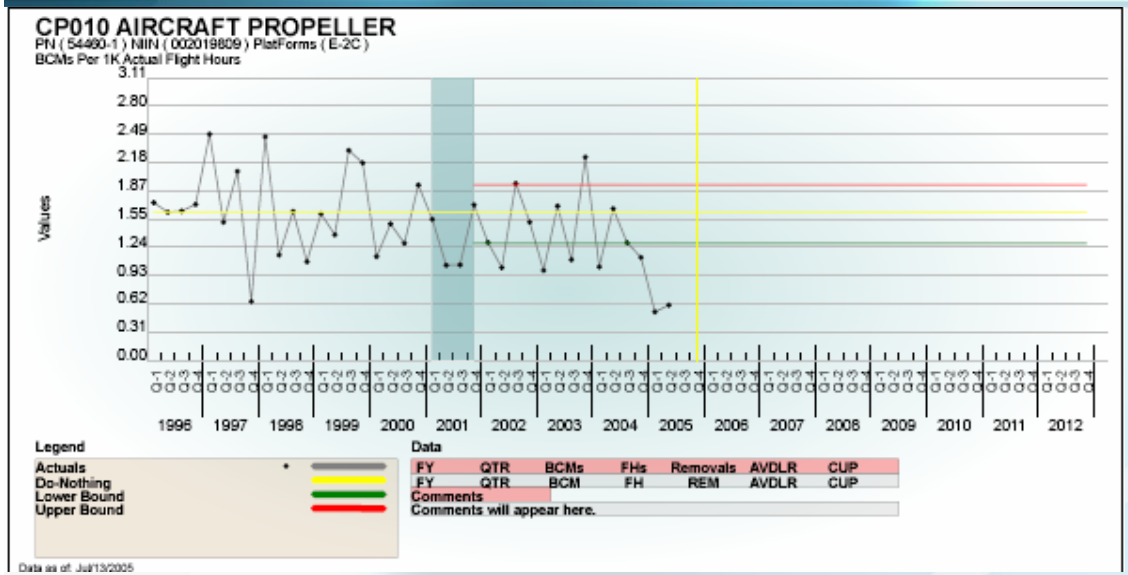
Immediate Impact:
Near immediate arrestment in increasing BCM trend

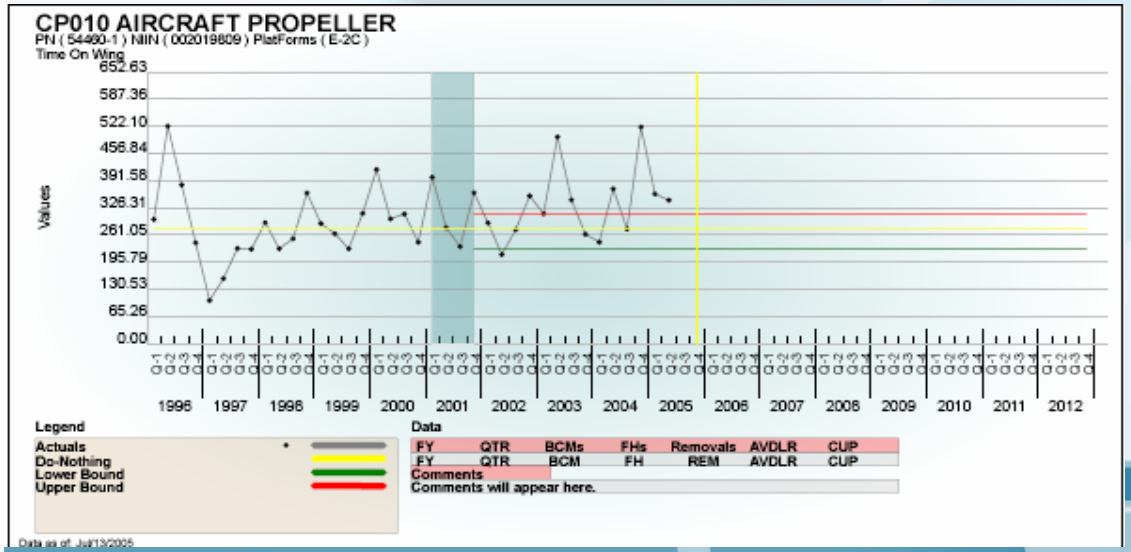


Long Term Results/Benefits:

- ✓ BCM/kFH rate decreased by 34% from existing trend since 3rd quarter FY01
- ✓ TOW increased by 44% from existing trend since 3rd quarter FY01

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.