Maritime Maintenance For The 21st Century

2007 DoD Maintenance Symposium
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Outline

◆ Organizational, Intermediate and Depot Level Maintenance (O/I/D)
◆ Continuous Maintenance Availabilities (CMAV)
◆ Multi-Ship/Multi-Option Contracting (MSMO)
◆ Integrated Condition Assessment System (ICAS)
Maritime Support Detachment demonstrates Intermediate and Organizational (I/O) Combination in LCS Class
Continuous Maintenance Availabilities (CMAVs)

- Navy continues to go toward Continuous Maintenance such as CVN Carrier Incremental Availabilities (CIAs) in new operational cycle

- CMAVs reduce the material readiness “bath tub” effect
- CMAVs reduce work load variation – provides level-loading
Multi Ship Multi Option (MSMO) Contracting

- Strategy: Max MSMO contracts for Surface Maint / Mod
- Continuous, responsive, accessible, flexible, affordable, 24/7 maintenance delivery process
- Enterprise Behavior + MSMO supports FRP and delivers required A₀ to Fleet
- LHD-7 Capstone test of MSMO-AIT integration
Fleet Readiness Enterprise

- Lead and Empower
  Warfare Enterprise
  Readiness/Cost improvement
- Drive Enterprise Maturity
- Barrier Removal
- Fiduciary Integrity
- Incentivize Enterprise Behavior
- CPF Collaboration

The FRE includes five Warfare Enterprises, led by respective Force Commanders. Each of these Warfare Enterprises supports the FRE in delivering combat capability to Navy Components and Combatant Commanders, via the training processes of Commander Second Fleet and Commander Third Fleet.
• 8 CLASSRONs stood up JUN ’07
**Integrated Condition Assessment System (ICAS) Capabilities**

- CBM implementation tool
  - Machinery Data Trending
  - Rules-based expert system
  - Vibration Analysis
- Troubleshooting Aid
  - Rules-based expert system
  - Event capture
- Operational Assessment
  - Material Assessment
  - Plant Situational Awareness
  - Assessment Visit Support (Availability Planning)
- Tool that enables reduced manning
- ILS -- access & linkage to PMS, EOSS and IETMs
- Electronic Log Sheets

**Data Logging / Situational Awareness**

**Continuous Analysis**

ICAS Expert System:
- performs a continuous analysis of machinery data.
- automatically generates maintenance advisory
DDG 74 – AC Plant Fouled Condensers

**Reverse Distance Support Timeline**

- **ICAS Data received from ship**: Time: 0 hrs
- **ICAS Data processed into IPAR view**: Time: +8hrs
- **Data Verified by SME**: Time: +16hrs
- **Recommendations documented in pdf**: Time: +72hrs
- **RDS summary emailed to MELS for distribution**: Time: +74hrs
- **SME Performance review complete**: Time: +76hrs

**Background**
- Ship deployed
- Crew reports having trouble cooling the ship. All four A/C plants underperforming.
- Ship requests Tech Assist from RMC.

**Analysis performed**
- RMC requests ICAS data be sent shore-side for immediate Tech Assist
- RMC analyzes IPAR report
- Identifies fouled condensers on all four A/C Plants. Recommends ship clean condensers
- Ship disagrees with recommendation, as A/C Plant maintenance was just accomplished by contractor, including the cleaning of all four condensers.
- RMC Rep was in area and visited ship
- Confirmed condenser fouling.

**Action Taken**
- All four AC Condensers were cleaned and post performance analysis via IPAR confirmed improved condenser performance

**Results/Benefits**
- On-site inspection confirmed suspected performance cause that was determined via IPAR
- Illustrates ability to use ICAS/IPAR in support of Remote Tech Assist
- Illustrates ability to use ICAS/IPAR in support of maintenance validation
Today’s Maintenance Strategy

FRP Readiness + Life Cycle Readiness

Cost

Material Readiness

Ship Maintenance & Modernization Domain

Fleet Readiness Enterprise

FRP Readiness + Life Cycle Readiness

Units Ready For Tasking

NCCs

COCOMs

Signal

Demand

$
Backup Slides
Elements of Success in LHD 7 Capstone

◆ MSMO funded to develop a detailed, integrated, & balanced master production & test plan
◆ Resolved modernization package potential conflicts in planning
◆ MOU negotiated between stakeholders
  ■ NSA (MARMC) designated as arbiter

◆ Results
  ■ Availability completed on time, at programmed cost
  ■ MSMO returned $1.5M to the Navy due to reduced OT, growth, new work and disruption costs (ROI = 400%)
  ■ All AITs were able to execute tasking per the original master schedule without adverse cost impact
◆ Demonstrates MSMO support to FRE in delivering combat capability
PRODUCE WARSHIPS READY for TASKING
DDG 66 GTG High Startup Vibration

Reverse Distance Support Timeline

- First ICAS data offload received
- First RDS Event for Ship

ICAS Install

Data Verified by SME and compared to failure library

Recommendations documented in pdf

- Ship contacted and begins troubleshooting (waterwash, transducer inspection, etc)

- MARMC SME performed borescope inspection. Damage found on 4th stage blade

MARM Change out request

SME Performance review complete

Background
- Ship preparing for 18 month SEA SWAP deployment
- All Gas Turbines were thought to be in good condition
- Problem identified with first data offload after install

Analysis performed
- Startup vibrations compared to DDG80 GTG high vibe problem that resulted in engine replacement due to 4th Stage turbine blade damage
- Vibe signature matched and suspected 4th stage turbine damage on GTG#1

Action Taken
- Ship notified (in POM period) and begins troubleshooting
- MARMC performs borescope inspection during connection of independent vibration gear
- Borescope revealed, (as suspected), 4th stage turbine blade damage

Results/Benefits
- Engine replacement accomplished stateside prior to ship deployment
- Reduced replacement cost
- Increased Ship/System Readiness