Life Cycle Approach to Maintenance Engineering & Planning

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The Brief Will Cover

• The Challenge of Ship Lifecycle Maintenance.
• How the Ship Maintenance Requirement is developed
• How the Ship Maintenance is tracked.
Surface Ship Life Cycle Mandate

• To meet mission of the Navy, requires attainment of 313 ships by 2020.
• Attaining 313 requires 240 of today’s hulls to remain in service
• Maintenance strategy must be aligned in support of:
  – Individual ship Current Readiness
  – Fleet Response Plan (FRP) Ao
  – Expected Service Life (ESL)

Life Cycle Plan to support Current Readiness, FRP and ESL
NIMITZ Class

Date Deployed: May 3, 1975
Unit Cost: About $4.5 billion
Propulsion: Two nuclear reactors, four shafts.
Length: 1,092 feet
Displacement: 97,000 tons
Speed: 30+ knots
Crew: Ship's Company: 3,200 - Air Wing: 2,480.
Armament: Multiple NATO Sea Sparrow, Phalanx CIWS, and (RAM) mounts.
Aircraft: 60+

Plan is to maintain the USS NIMITZ for 50 years.
NIMITZ Class will support several new variations of aircraft over the 50 years of service.

New capabilities added over time
Supports 11 NMETS (Navy Mission Essential Tasks.)

- 65 Functional Areas
- 517 major systems;
- 12,483 equipment systems
- 150,000 major pieces of equipment (Does not include ice cream maker.)

... and the wide range of Sailors and skills required.
The Challenge: NIMITZ Class

HM&E Equipment Systems

- Life Support Systems
- Steam Generators/Steam System Controls
- Auxiliary Equipment and Fluid Systems
- Diesel Engines Systems
- Power Transmission Systems
- Gas Turbine Systems
- Electric Power Systems
- Logistics Data
- Condition Assessment Systems & Video Systems
- Sensors Systems & Wireless Sensor Systems
- Machinery Controls
- HM&E Networks
- Integrated Bridge Systems
- Aircraft, Vehicle, Ship & Material Handling
- Cargo/Weapons Handling & Stowage Systems
- Launch Recovery and Hydraulic Systems
- Hull Outfitting & Habitability
- Climate Control & Compressed Air Systems
- Auxiliary Machinery Controls
- Fasteners
- Fuels and Lubricants
- Coatings & Corrosion Control
- Thermal Insulation, Gaskets, Packings & Seals
- Water Chemistry
- Liquid and Solid Waste Systems
What’s Most Important in Ship Maintenance?

Lifecycle Requirements and Work Package Integration
SEA 21/SURFMEPP

Maintenance Team Execution Integration
Individual Ship Waterfront Experts

Commissioning

De-Commissioning

Fleet Readiness Plan
FRP
TYCOM/CLASSRON

Current Readiness
Ship’s Force/ISIC

Balancing Resources and Requirements from all Perspectives
Mandates opening “apertures” across the End – to – End process
Class Maintenance Plans

• Class Maintenance Plans (CMP) are the “maintenance manual” of the ship class. Specifically included are:
  – Maintenance Delivery Plan including required dry-docking intervals
  – Engineered maintenance requirements such as equipment overhauls, shaft replacements, and corrosion protection
  – System certification requirements (nuclear, subsafe, flight deck)
• CMPs are continuously updated based on class maintenance history

Class Maintenance Plans (CMP) = “Automobile’s Maintenance Manual”
EDSRA mid life requirements spread out so that maintenance and program alts can be accomplished within contractual constraints.

Notional done by AVAIL

The plan to reach expected service life.
Investment & Readiness Gap

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<th>SURFMEPP Focus</th>
<th>USS XYZ</th>
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<th>Cumulative Man Days (1000)</th>
<th>Expected Service Life</th>
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<td>Results in decreasing operational availability and increasing operational risk</td>
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- Define Requirements and Track Against Actual Investment
Summary

• Ship maintenance is a complex challenge that requires overall system integration.

• Maintainability requirements developed from the system requirement and at the individual equipment level are incorporated into the CMP.

• Ship maintenance is tracked at the equipment level and lessons learned used to improve future readiness.
Questions?