ESOH Challenges in Commissioning an Aircraft Carrier

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Summary

- Complex operational environment.
- Manning challenges.
- Design/Contract challenges.
- Equipment challenges.
- ESOH challenges.
- Hazardous Materials
- Safety Equipment
- Training
USS CONSTELLATION (exCV-64)
NGNN Aircraft Carriers

90,000 TONS OF DIPLOMACY

NORTHROP GRUMMAN
Complex Operational Environment

• Busy place. NGNN has 1000+ cranes, many forklifts, 3 shifts of operation, 19k+ employees.
  – COMMERCIAL YARD!
• Carrier takes 5 years to build. Some crew there ~2 years prior to commissioning, phased manning.
• Carrier build ~$5.5B + outfitting + modernization. ~ 50M manhours.
NIMITZ Class (CVN-68)

- Builder: Newport News Shipbuilding Co, NGNN/NGSB
- Unit Cost: ~ $4.5B each, + planes & supplies.
- Propulsion: 2 nuclear reactors, 4 shafts.
- Length: 1,092 ft
- Beam: 134 ft
- Flight Deck Width: 252 ft
- Displacement: ~ 97k tons (88k metric tons) full load.
- Speed: 30+ knots (34.5+ mph).
- Crew: Ship's Company: 3,200 - Air Wing: 2,480.
- Aircraft: 85
KITTY HAWK, NIMITZ AND STENNIS-
Intended Area of Use = Complex Operational Environment

Photo: US Navy
Design/Contract Challenges

• 1970s Design.
  – Little changed from first NIMITZ design.
  – Shipalts/mods not normally done at yard, wait on PSA/SRA.
  – “As designed/built” to pass INSURV/Navy Acceptance Trials, then many items ripped out/replaced at SRA.
    » Wet Chemistry Photolab.
  – FORD design ~complete, little Fleet input.
    » Too late to input ESOH problems now/not in contract.
BUSH, 2nd with new bulbous bow

Photo: Northrop Grumman
BUSH in drydock, May06

Photo: Northrop Grumman
Superlifts: Upper Bow, Island

Photos: Northrop Grumman
BUSH in drydock, Sep06

Photo: Northrop Grumman
PCU BUSH Christening, Oct 7, 2006

Photo: Northrop Grumman
Manning Challenges

• Few people initially. Everyone has multiple jobs.
• As Safety Dept and rest man up, most are not trained for primary and collateral duties.
• First ship or carrier tour for many.
• Safety Dept = TAD bodies.
**Schedule**

- Keel laid: Sep 03
- First crew onboard: Jun 06
- 25% ~ Dec 06
- 50% ~ Jun 07
- 75% ~ Jan 08
- Light off reactor Jul 08
- Crew moveaboard Aug 08
- Builder’s Trials Oct 08
- Navy Acceptance Trials Dec 08
- Commissioning Jan 09
- SRA/PSA Mar 09
- Workups/FCT late 09
- First Cruise late 2010
The Ship

• Seven-year construction timeframe.

• 47,000 tons of structural steel and about a million pounds of aluminum

• Modular construction process forms large individual units of the ship much like interlocking building blocks

• Units welded together to form a module or superlift weighing up to 900 tons.
The Ship

• Top speed 30+ knots.

• 2 nuclear reactors, operate 20+ years without refueling.

• ~50 years lifespan.

• Three two-inch diameter arresting wires on the flight deck bring an airplane going 150 MPH to a stop in < 400 ft.
ESOH Challenges During Construction
Equipment Challenges

• Buy initial outfitting items, no gear comes with the job.
• AELs are wrong.
• Supply Dept undermanned, no HAZMAT program.
• RPPO untrained.
• Byzantine supply system (not standard methodology).
ESOH Challenges

• Getting people to wear PPE.
• Constant training challenges- new people, new equipment, new systems, complex operations.
• Commercial yards have their own rules- some are arbitrary.
• Navy DOES NOT OWN THE SHIP, DOES NOT OWN THE YARD.
  –Barge, rented offices, Huntington Hall.
ESOH Challenges

• Shipyard owns emergency (med, spill, fire, envm) response until move-aboard.
• While working aboard, follow yard rules-if we know/understand them.
• SUPSHIP is intermediary.
HAZMAT Challenges

• One BM2/9595 for first year (Jul06-Dec07).
• No AUL, limited visibility on ordering.
• SERVMART provides HAZMAT- which may be fine for shore offices but not usable onboard.
• Safety Dept BM1/SK1 9595- late arrivals (Mar08).
• Have/use HAZMAT before program in place.
  – Training, Hazcomm standard, PPE, disposal.
Safety Equipment Not Available Until Crew Moveaboard

• Just Prior To Builder’s Trials
• 195 List/Exclusion Items:
  – EEBDs & SCBAs.
  – Bull’s Eyes, CCOLs, SIB.
  – Fire fighting equipment.
  – Ladder chains.
  – Nonskid decks.
  – Deck coverings & deck markings.
Training Challenges

• Many new, unique, untried systems.
• Navy crew doesn’t own systems, yard does initially.
• Vendor prepares maintenance + training pubs - often late in the game.
• Crew must be trained/prepared for ATG Crew Certification, Builders and Navy Acceptance Trials.
Recommendations

• Standardize and implement consistent, timely SSWGs and allow changes to contract and design early in design cycle.
• More fleet/user community involvement, earlier- and USE their suggestions.
• Make and use passdown/lessons learned.
• More SUPSHIP oversight during all phases of build process.
CVN-78 Plan

- Enhanced Ship Self Defense
  - Evolved Sea Sparrow Missile
  - Underwater Protection

- Improved Weapon & Material Handling
  - Outboard Weapons Elevators
  - Heavy Underway Replenishment
  - Double Height Magazines & Storerooms

- Integrated Island
  - Composite Mast
  - Smaller Island Re-Positioned Aft & Outboard
  - Joint Precision Approach and Landing System
  - Advanced Arresting Gear
  - MFR/VSX Radars
  - Expanded Flight Deck Footprint "Pit Stop"

- Improved Survivability
  - New Propulsion/Electric Plant
  - Zonal Electrical Distribution System
  - Hangar Bays (2)
  - 4 ElectroMagnetic Aircraft Launching Systems (EMALS)
  - Aircraft Elevators (3)

Image: US Navy
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Questions?

One Mission, One Vision, One Team, One Fight!
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