DDG 1000 Class Destroyer

13 January 2015

Surface Navy Association (SNA) 26th National Symposium

DDG 1000 Overview

DDG 1000 Program Manager, PMS 500
CAPT Jim Downey
DDG 1000 ZUMWALT Christening
12 April 2014
DDG 1000 Program Highlights

- **Started DDG 1000 fabrication February 2009 – 94% complete (as of Dec 19)**
  - Resulting in full ship (15,000 tons, 610 ft long)
  - Hangar arrived May 2012 at BIW and erected Jul 2012
  - Deckhouse arrived Nov 2012 at BIW and erected Dec 2012
  - Launch – 28 Oct 2013
  - Christening – 12 Apr 2014
  - Test and Activation underway

- **Started DDG 1001 fabrication March 2010 – 80% complete (as of Dec 19)**
  - 100% of DDG 1001 is in fabrication at BIW and HII
  - Keel Laying 23 May 2013
  - Hangar arrived Oct 2013 at BIW
  - Deckhouse arrived Sep 2014 at BIW and erected Nov 2014

- **Started DDG 1002 fabrication 4 April 2012 – 28% complete (as of Dec 19)**
  - Fabrication underway – 10% complete
  - Material at 45% complete
  - Steel deckhouse / hangar design progressing to plan

- **Integrated Power System (IPS) testing at Philadelphia Land Based Test Site (LBTS)**
  - Full Power (local control) completed May 2011
  - IPS with Engineering Control System (ECS) completed March 2012
  - Energized High Voltage Sep 2013
  - Transitioning LBTS equipment FY15-16 (DDG 1002 production equipment)
DDG 1000 Program Highlights (Cont’)

• 98% of Mission Systems Equipment (MSE) delivery complete for DDG 1000 and 1001
  – Equipment delivered on time or early to shipyard

• SPY-3 with integrated volume search
  – Testing of X-Band Mods for Volume Search at Wallops Island underway, then Self Defense Test Ship (Q4FY15)

• Software development progressing to support ship activation and delivery
  – Software Releases (SR) 1-7 completed
  – Release 8 available Q1FY16

• Advanced Gun System (AGS) manufacturing underway at 3 facilities (Cordova, AL; Fridley, MN; and Louisville, KY)
  – 1st Ship AGS magazines and guns delivered early to BIW; MT61 and MT62 installed
  – 2nd Ship magazine installation complete
  – Testing of 1st AGS gun at Dugway Proving Grounds, UT completed
  – All 3 Ship sets under contract

• Long Range Land Attack Projectile (LRLAP) development and testing
  – Guided flight tests (GFT) successfully completed Oct 2013
    • Demonstrated max range capability
    • Demonstrated outstanding accuracy
    • Demonstrated HOB operation with excellent lethality
  – Rocket motor redesign complete including hot/cold/ambient static fire tests
  – Transition to production in progress to support Low Rate Initial Production (LRIP)
Carry the fight to the enemy through offensive operations and destroy enemy targets ashore with precision strike and volume fires

Contribute to littoral dominance: surface, air, sub-surface

Employ an open architecture total ship computing approach

Be highly survivable

Reduce crew size

**Requirements Document**

- DD(X) Operational Requirements Document, Change 1 approved, dated Jan 2006
- DD(X) will transition from a single step to full capability approach to a spiral acquisition
  - Spiral acquisition fields operationally and supportable capability in as short a time as possible, with the explicit intent of delivering improved or updated capability in the future
- Acquisition Risk Mitigated thru spiral development, modeling & simulation, and a combination of land-based / at-sea testing

**Key Performance Parameters**

<table>
<thead>
<tr>
<th>Interoperability</th>
<th>Objective</th>
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<tbody>
<tr>
<td>Top Level IERs</td>
<td>All IERs</td>
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<table>
<thead>
<tr>
<th>Number of Guns</th>
<th>2</th>
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<tbody>
<tr>
<td>Gun Magazine Capacity</td>
<td>600</td>
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<tr>
<td>Vertical Launch Cells</td>
<td>80</td>
</tr>
<tr>
<td>Radar Cross Section</td>
<td>175</td>
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<tr>
<td>Manning</td>
<td>125</td>
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<tr>
<td>Survivability (5)</td>
<td>125</td>
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<tr>
<td>Force Protection (2)</td>
<td>125</td>
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**Designed to meet all requirements; Evolutionary Acquisition – Spiral Development**
DDG 1000 Characteristics

### Hull
- Wave-Piercing Tumblehome

### Sensors
- SPY-3 X-Band Multi-Function Radar (MFR)
- Volume Search Radar (VSR) (Space & Weight Reservation)
- HF & MF Bow Sonar Arrays
- Multi-Function Towed Array
- EO/IR System
- ES System
- EXCOMMS – Alternative Navy C4I POR

### Weapons
- (80) Advanced Vertical Launch (AVLS) cells for Tomahawk, ESSM, Standard Missile
- (2) Advanced Gun System (AGS) 155 mm guns
- (600) 155 mm rounds
- (2) MK 46 Close In Guns (CIGS)

### Superstructure
- Composite Structure
  - DDG 1000 / 1001
  - DDG 1002

### Integrated Power System (IPS)
- (2) Main Turbine Generators (MTG)
- (2) Auxiliary Turbine Generators (ATG)
- (2) 34.6 MW Advanced Induction Motors

### Aviation
- MH60R and (3) VTUAVs
  (Capacity for 2 MH 60Rs)

### Boats
- (2) 7m RHIBs
  (sized for (2) 11m RHIBs)

### Crew Size
* 130

### Characteristics
- Overall Length: 610 ft
- Maximum Beam: 80.7 ft
- Navigational Draft: 27.6 ft
- Speed: 30 kts
- Displacement Full Load: 15,612 LT
- Installed Power: 78 MW

### Displacement Full Load
- MTG
- ATG
- 34.6 MW Advanced Induction Motors

### Nunn McCurdy
- Jun 10

*Distribution Statement A: Approved for Public Release. Distribution is unlimited.*
DDG 1000 Critical Technologies
Engineering Development Models (EDMs) Used to Mitigate Production Risk Prior to Milestone B Decision

**Dual Band Radar (DBR)**
- MFR (X Band) at sea-based testing complete
- VSR (S Band) land based testing complete
- Leap ahead clutter rejection capability in the littorals
- MFR modification complete; testing underway
  - Volume Search mod complete
  - DDG 1000 (2015-2016)

**Composite Deckhouse & Apertures Test Article**
- Composite production ability proven
- Tested for RCS and EMI
- Validated RCS KPP can be achieved

**Advanced Gun System (AGS)/Long Range Land Attack Projectile (LRLAP)**
- Full scale Gun and Magazine produced
- Automated Magazine and Gun rate of fire validated
- Tactical Rocket Motor design demonstrated at threshold 63 NM range
- LRLAP Tactical Guided Flight Tests completed Oct 2013
  - LRIP Q4FY15

**Peripheral Vertical Launch System (PVLS) / Advanced VLS**
- Detonation tests and missile restrained firing testing complete
- Enhanced survivability design proven and ability to carry all current missiles (SM 2/3/6, ESSM, VLA with CEU mods)

**Integrated Power System (IPS)**
- Full scale testing of components
- Full rated power and torque validated
- IPS motor fabrication started
- Full Power testing completed
- ECS LBTS testing completed
- HM&E Activation Underway
  - Energized High Voltage Sep 2013
  - AIM light off Jul 2014
  - Generator light off Sep 2014
  - SAC Nov 2014

**Autonomic Fire Suppression System (AFSS)**
- At-sea weapons effect autonomic fire suppression testing demonstrated
- Critical technology enables reduced manning

**Total Ship Computing Environment (TSCE)**
- Software Releases 1-7 complete
- Open Architecture principles applied
- R8 available Q1FY16
  - 83% Complete as of Dec 2014

**Hull Form Scale Models**
- Sea keeping, stability and RCS performance validated by model testing
- Underwater explosion testing complete – hull whipping requirement validated
- Hull form certification underway
  - Cert/ Guidance for Trials received
  - Heavy Weather Guidance Q3FY15

**Integrated Undersea Warfare (IUSW)**
- At-sea mine avoidance capability proven
- Reduced ASW manning validated
Summary

• **DDG 1000 will be a multi-mission surface combatant tailored for the littorals**
  – Signature reduction, active and passive self-defense systems, and enhanced survivability features
  – Designed to fulfill volume firepower and precision strike requirements
  – Provides credible forward naval presence while operating independently or as an integral part of Naval, Joint, or Combined Expeditionary Strike Forces
  – Reduced Life Cycle Cost

• **DDG 1000,1001,1002 under contract and significant production underway**
  – DDG 1000/1001/1002 completion 94% / 80% / 28% as of Dec 2014
  – Most complete outfitting for first of class at launch