DDG 1000 Class Destroyer

DDG 1000 Overview

17 Apr 2013

The American Society of Naval Engineers (ASNE)

Flagship Section

DDG 1000 Program Manager, PMS 500
Captain Jim Downey
Summary

• All 3 ships progressing well
  – DDG 1000/1001 completion 82% / 58% as of 29 Mar13
  – DDG 1002 April 2012 Start Fab
  – Unprecedented 98% first time quality for first of class
  – Most complete projected outfitting for first of class at launch

• DDG 1000 - 2014 HM&E delivery; 2015 Combat Systems Activation; and 2016 IOC
DDG 1000 Program Highlights

• Started DDG 1000 fabrication February 2009 – 82% complete (as of 29 Mar 2013)
  – 9 of 9 Ultra Units on Land Level
  – Resulting in full ship (15,000 tons, 610 feet long)
  – Hangar arrived May 2012 at BIW and erected Jul 2012
  – Deckhouse arrived Nov 2012 at BIW and Erected Dec 2012

• Started DDG 1001 fabrication March 2010 – 58% complete (as of 29 Mar 2013)
  – 100% of DDG 1001 is in fabrication at BIW and HII

• Started DDG 1002 fabrication 4 April 2012

• Integrated Power System (IPS) testing at Philadelphia Land Based Test Site (LBTS)
  – Full Power (local control) completed 11 May 2011
  – IPS with Engineering Control System (ECS) completed 20 March 2012
DDG 1000 ZUMWALT
Bath Iron Works

DDG 1000 Keel Laying
17 Nov 2011

Unit 2200 Move
15-16 Mar 2012

Unit 3450 Erection
30 Jul 2012

Hangar Erection
31 Jul 2012

4220 Erection
15-16 Mar 2012

DDG 1000 Deckhouse Landing 14 Dec 2012
• 94% of Mission Systems Equipment (MSE) delivery complete for DDG 1000 and 1001
  – Equipment delivered on time or early to shipyard
• Dual Band Radar (SPY-3 / VSR)
  – Developmental testing at Wallops Island completed Sep 2010
  – X Band Mods under development
• Software development progressing to support ship activation and delivery
  – Software Releases (SR) 1-5 complete and certified
  – SR 6 coding complete; Integration & Testing in progress
  – Spiral SW Release under contract and timed to support Post Delivery Availability (PDA) / Post Shakedown Availability (PSA) / Initial Operational Capability (IOC)
• 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
  – 2nd Ship magazine installation in progress
  – 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 ongoing
  – Rocket motor redesign complete including hot/cold/ambient static fire tests
  – Low Rate Initial Production (LRIP) planned for FY14
Huntington Ingalls Industries (HII)

- All of DDG 1000 class products (Composite Deckhouse, Composite Hangar, four (4) Aft Peripheral Vertical Launch System (PVLS) modules) delivered 2010-2012
- DDG 1001 class products are nearly 2/3 complete
  - Aft PVLS zones 3160 & 3170 delivered August 2012
  - Aft PVLS zones 3260 & 3270 >80% complete and delivery is Summer 2013
  - Composite Hangar >70 % complete and delivery in Summer 2013
  - Composite Deckhouse ~60% complete and delivery in Winter 2014

2012 Deliveries
Raytheon’s Systems & Software Scope

External Communications
• 1 X/Ka Open Ocean SATCOM Antenna
• 4 CEC Arrays
• 6 EMEs for radio terminal and ICC

Sensors
• SPY-3 Radar with Volume Search
• SQQ-90 Acoustic Sensor Suite (HF, MF, MFTA Handling Equipment)
• EO/IR Systems (3 Sensors)
• IFF System
• Electronic Surveillance
• 6 EMEs for Sensor Electronics

Ship Control Systems
• Integrated Bridge System (IBS)
• Navigation System
• Engineering Control System

Weapons
• 20 MK57 Vertical Launching System (4-cell Modules)

Total Ship Computing Environment
• 2 Data Centers (4 EMEs)
  – Data Processing & Storage
  – 6 Information Domains
• Time/Nav. Data Distribution
• Network, High Assurance Guards, Encryption Devices, Phones, Cameras
• 1 Manned & 1 Equipment SCIF
• 48 Large Screen Displays
• Admin PCs/Laptops/PDAs

Radar Support Systems
• Common Array Power System (CAPS)
• Common Array Cooling System (CACS)

Total Ship Computing Software
• 6.7M SLOC
• Integrated Engineering Control & Combat Systems Software

Ship Activation Support

Total 2,300 delivered line items per ship

Distribution Statement A: Approved for Public Release; distribution is unlimited.
DDG 1000 Mission Systems
Raytheon

SQQ-90 MF Sonar
MK57 VLS

IFF System
ExComms X/ka Antenna
TSCE Data Center

SPY-3 Radar
Common Array Cooling
Common Array Power
AGS / LRLAP Status  
**BAE Systems**

- Completed delivery of Magazines and Gun Mounts for DDG 1000 & 1001
  - Magazines installed in DDG 1000
  - Gun mounts being readied for installation on DDG 1000
- On contract for DDG 1002 AGS with production underway
- Six successful LRLAP flights in January and March 2013 campaigns
  - Demonstrated max range capability
  - Demonstrated outstanding accuracy
  - Demonstrated HOB operation with excellent lethality
  - On track for next flight test series in June 2013
DDG 1000 Requirements

• 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

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<thead>
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<th>Threshold</th>
<th>Objective</th>
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<tbody>
<tr>
<td>Interoperability</td>
<td>Top Level IERs 2</td>
<td>All IERs 2</td>
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<tr>
<td>Number of Guns</td>
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<td>1200</td>
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<td>Gun Magazine Capacity</td>
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<td>Vertical Launch Cells</td>
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<td>128</td>
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<td>Radar Cross Section</td>
<td>175</td>
<td>125</td>
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<tr>
<td>Manning</td>
<td>175</td>
<td>125</td>
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<tr>
<td>Survivability (5)</td>
<td>175</td>
<td>125</td>
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<tr>
<td>Force Protection (2)</td>
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<td>125</td>
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Designed to meet all requirements
Evolutionary Acquisition – Spiral Development
DDG 1000 Critical Technologies

Engineering Development Models (EDMs) Used to Mitigate Production Risk Prior to Milestone B Decision

**Advanced Gun System (AGS)/Long Range Land Attack Projectile (LRLAP)**

- Full scale Gun and Magazine produced
- Automated Magazine and Gun rate of fire validated
- 9 EDM Guided Flights/Tests successfully conducted through 2006
- 20 of 35 planned LRLAP Tactical Guided Flight Tests completed as of Mar 2013 (WSMR)
- Tactical Rocket Motor design demonstrated at threshold 63 NM range

**Composite Deckhouse & Apertures Test Article**

- Composite production ability proven
- Tested for RCS and EMI
- Validated RCS KPP can be achieved

**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 underway

**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

**Autonomic Fire Suppression System (AFSS)**

- At-sea weapons effect autonomic fire suppression testing demonstrated
- Critical technology enables reduced manning

**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)

**Total Ship Computing Environment (TSCE)**

- 5 of 6 Software Releases complete
- Open Architecture principles applied
- Release 6 Coding complete
- Release 6 Integration and Testing underway
- Spiral update supports PDA/PSA schedule

**Integrated Undersea Warfare (IUSW)**

- At-sea mine avoidance capability proven
- Reduced ASW Manning validated

**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

**SDTS FY06-08**

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- VSR (S Band) land based testing complete
- Leap ahead clutter rejection capability in the littorals
- MFR modification underway

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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

**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) Close In Guns (CIGS)
- Torpedo Defense (Space Reservation)
- Anti-Terrorism

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

**Superstructure**
- Composite Structure

**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
- Crew Size: 148
  (incl. Aviation detachment)

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

**Boats**
- (2) 7m RHIBs (sized for (2) 11m RHIBs)
# DDG 1000 Zumwalt Class Planning Schedule

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<tr>
<th>01 March 2013</th>
<th>FY 10</th>
<th>FY 11</th>
<th>FY 12</th>
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## Program Milestones

- **DDG 1000**
  - Nunn-McCurdy Milestone B
  - Annual Review
  - Gate 6
  - Annual Review
  - Annual Review
  - Annual Review
  - Milestone C

- **DDG 1001**
  - Lay Keel
  - Continue Manufacturing & Award Remaining Construction
  - Lay Keel
  - Christening / Launch
  - HM&E Delivery
  - Mission System Acceptance Trials
  - Sail Away
  - OPEVAL
  - IOC

- **DDG 1002**
  - Start Fabrication
  - Award Construction Contract
  - Start Fabrication
  - Lay Keel
  - Christening / Launch
  - HM&E Delivery
  - Mission System Acceptance Trials
  - Sail Away
  - Commissioning

## DDG 1000 2014 HM&E Delivery, 2015 Mission Systems Activation, and 2016 IOC

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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 Initial Operational Capability (IOC) in FY16