



Sea Air Space Exposition

John F. Kennedy (CVN 79) Enterprise (CVN 80) & Unnamed (CVN 81) - Two Ship Buy

CAPT Philip Malone

Program Manager

CVN 79/80/81 Program Office (PMS 379)



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Gerald R. Ford Class System Description



The Gerald R. Ford class is equipped with **advanced operational capability, survivability, and flexibility** to accommodate next-generation technology and war fighting capability over its 50 year service life.

As the **premier forward asset for crisis response and early decisive striking power** in major combat operation, the FORD class aircraft carrier and carrier strike group will provide deterrence, forward presence, maritime security, humanitarian assistance and will ensure freedom of the seas.

The Gerald R. Ford class brings improved warfighting capability and quality of life improvements for our sailors at a reduced total ownership cost.

CVN 78 USS Gerald R. Ford (Delivered May 2017)

CVN 79 John F. Kennedy (Delivery 2024)

CVN 80 Enterprise (Delivery 2028)

CVN 81 Unnamed (Delivery 2032)



~6,600 HII Newport News Shipbuilding employees are involved in CVN 78 – CVN 81 construction.



Gerald R. Ford Class More Capable



- A Sustained Sortie Generation Rate constituting a **33 percent improvement** over the NIMITZ-Class.
- A **propulsion plant providing approximately three times more electrical generating capacity** and a projected 30% reduction in maintenance compared to the NIMITZ-Class.
 - Increased electrical generating capacity allows for the introduction of advanced capabilities and provides flexibility for future modernization and the introduction of emergent technology.
- Increased Service Life Allowances (SLA) for weight and stability, **enabling future modernization and mission adaptation** over the ship's 50-year lifespan.
- **Improved survivability**, including modifications in the hull design, firefighting systems, and weapons stowage.



A \$4 billion reduction in Total Ownership Cost over each ship's lifecycle as compared to the NIMITZ-Class.



Carrier New Construction CVN 79, CVN 80, CVN 81



Driving Affordability Into Carrier Acquisition

- CVN 80 and CVN 81 two-ship buy saves over \$4B – Delivers increased Warfighter capabilities above current FORD Design earlier than expected.
 - Drives most aggressive Shipbuilder performance on CVNs to date
 - Stabilizes the Shipbuilding and GFE Vendor Industrial Base
 - Level-loads Shipyard resources and maximizes learning
- The CVN 80 and CVN 81 two-ship buy strategy further improves on CVN 79 efforts to frontload as much work as possible to the earliest phases of construction, where work is both predictable and more cost efficient.



Implementing Construction Efficiencies

- Facilities investment online to improve construction efficiency (unit outfitting hall).
- CVN 79 build sequence installs more parts in shop and on the final assembly platen, increasing the proportion of work accomplished early in the construction process.
- Several design changes have been implemented (from CVN 78 lessons learned and construction process simplification) to decrease cost.

Recent Accomplishments:

CVN 79

- 90% erected Mar 2019
- 57% total ship progress Mar 2019
- On track for early launch Nov 2019

CVN 80 / 81

- Two-ship buy awarded 31 Jan 2019



Gerald R. Ford Class

Achieving Sustained Affordability for the Class



Driving Down Construction Costs

GERALD R. FORD (CVN 78)

Christened Nov 2013
Delivered May 2017
Commissioned Jul 2017



- First new CVN design in 40 years
- New design specifications
- Design / build
- Digital manufacturing of pipe, steel
- New facilities

JOHN F. KENNEDY (CVN 79)

Keel Laying Aug 2015
57% total ship progress



- Modified repeat of CVN 78
 - Enterprise Radar Suite
 - Electric Aircraft Elevators
- Complete Bill of Material at start
- >60,000 lessons learned
- Build strategy improvements
- Increased use of digital data
- Phased delivery for affordability

18% fewer manhours (from CVN 78)

ENTERPRISE (CVN 80) / UNNAMED (CVN 81)

CVN 80 Planning Contract Awarded May 2016
CVN 80 / CVN 81 Construction begins 2019



- Rollover of CVN 79 design
- Lessons learned from both CVN 78 and CVN 79
- More build strategy improvements
- Integrated Digital Shipbuilding

22% overall labor reductions targeted (from CVN 79 to CVN 81)

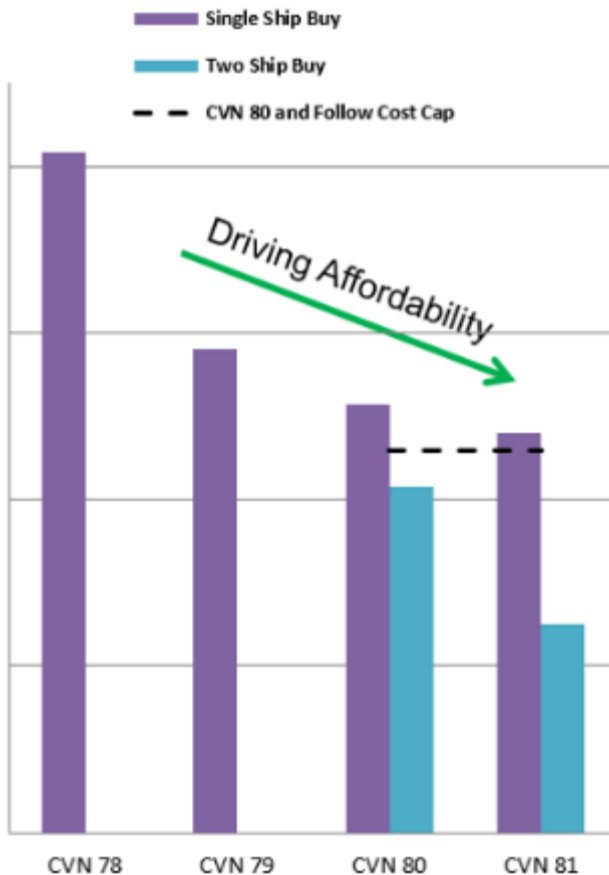


FORD Class Production Efficiencies

Production and Production Related Planning



Ford Class Total End Cost CP13\$

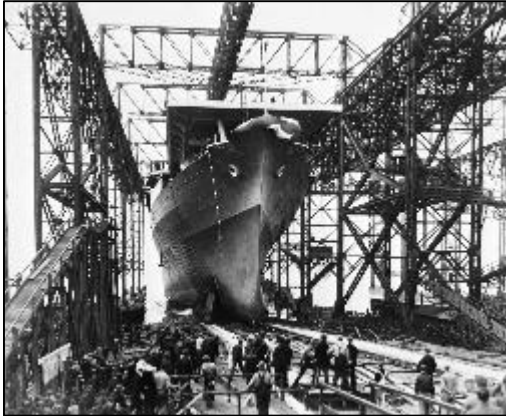


- **Larger Stepdown than NIMITZ Class**
 - Production improvement equivalent to 82% learning curve
 - 53% reduction in construction support (e.g., planning, engineering) for CVN 81
- **Production reductions**
 - Build Plan Improvements
 - Modular Construction
 - Facility investments
 - Integrated Digital Shipbuilding
 - Design For Affordability
- **FORD Class total hours near NIMITZ total hours with much greater capability**



Evolution of Carrier Construction at NNS

CVN 79 is the Latest of 32 Carriers Benefiting From Decades of Innovation



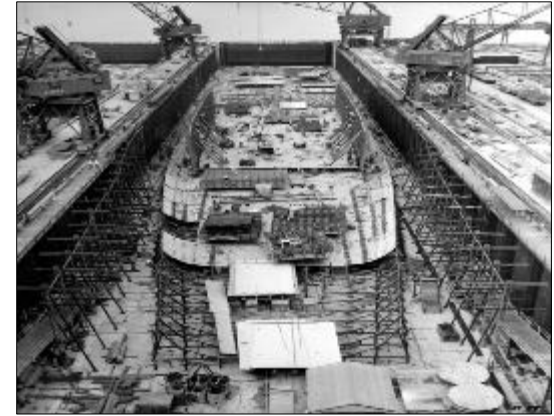
Stick-built on Inclined Ways

1930's Ranger on Shipway
3 Carriers / >800 Ft / ~25K Tons



Stick-built in Dry-Dock

1940's – The "War Carriers"
12 Carriers / >950 Ft / ~60K Tons



Stick-built With Some Box Units

1950-1960's -First "Super Carriers"
5 Carriers / Up to 1050 Ft / 80K Tons



Steady Evolution of Superlifts

1970 -1990's –
First Nuclear / First Modular Construction
10 Carriers / ~1090 Ft / 85K Tons



Superlifts With Significant Outfitting

Ford Class
Taking Modular Construction / Pre-Outfitting to a New Level

Reduction in Dock Erectables Key Build Strategy Change				
	CVN77	CVN78	CVN79	CVN80
Total Units	1,318	1,186	1,108	1,107
Superlifts	161	162	155	132
First & Final	433	334	292	177
Total Erectables	594	496	447	309

- ~75% Reduction in Lifts From CVN68 to CVN78
- 25% Reduction From CVN77 to CVN79
- Additional 31% Reduction on CVN80/81



John F. Kennedy (CVN 79)



➤ Overview

- 2-Phase Acquisition Strategy

➤ Jun 2015 – DD&C Contract Awarded

➤ Aug 2015 – Keel Laid

➤ Apr 2018 – 75% Erected

➤ Construction

- 91% Erected – 407 of 448 erectables in dock
- 57% total ship progress
- ~18% fewer manhours than CVN 78
- On track for early launch (Nov 2019)

Upcoming Shipbuilder Dates

- May 2019 – Island Landing
- ❖ Nov 2019 – Launch (was Feb 2020)
- Jun 2022 – Preliminary Acceptance
- Sep 2024 – Delivery



EMALS Motor Generator being loaded into Super-lift



“Mega-lift” Unit 5616 – Example of build strategy improvements in action. This single CVN 79 Mega-lift required 19 separate lifts on CVN 78, greatly improving CVN 79 construction efficiency.



Bulbous-Bow section being lowered to primary ship structure

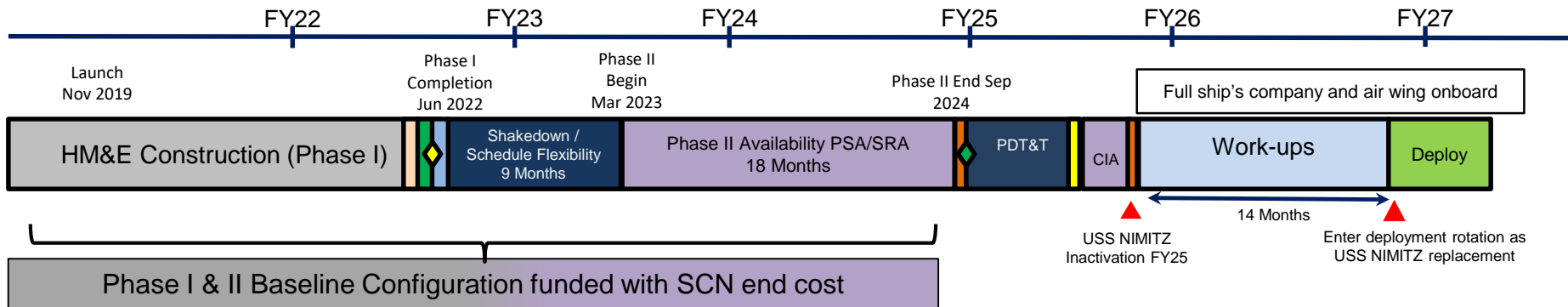


Flight Deck section being lowered to primary ship structure

(Photos courtesy of HII-NNS)



John F. Kennedy (CVN 79) Phase 1 and 2 Schedule



- ### Phase I
- Constructs the basic ship
 - Full propulsion capability
 - Aircraft launch & recovery equipment necessary to demonstrate flight deck
 - Core systems for safe navigation

- ### Phase II
- Completes remaining new construction systems including Enterprise Air Surveillance Radar (EASR)
 - Procure & install shipboard electronics at latest possible date
 - Preempts required Obsolescence Management work in first PIA

- ### Legend
- = Preliminary Acceptance
 - = Delivery
 - = BT (Builder Trials)
 - = AT (Acceptance Trials)
 - = ALRE Flight Demonstration
 - = Sea Trials
 - = ST (Special Trials)



All Phase I & II systems and installations included in CVN 79 end cost



Weather Covers



Unit Outfitting Hall

Facilities Investments

① Manufacturing Shops
"Components and Assemblies"



② Steel Fabrication
"Units"



③ Final Assembly Platen
"Superlifts"



④ Dock and Pier
"Compartments, Systems, Testing"



Efficiency Differences Based on Work Location

1 Hour in the Shop

=

3 hrs on Platen

=

8 hrs on Ship

Shifted 25% of Ship Piece Parts to Shop on CVN 79



Enterprise (CVN 80) and CVN 81



Overview

- Two Ship construction contract
- Single Phase Delivery
- First use of Integrated Digital Shipbuilding
- Increased ship lethality & warfighter capabilities

Current Status

- 12 of 1081 base units complete

Schedule

- ✓ May 2016 – Advance Procurement Contract / Initial Long Lead Time Material awarded
- ✓ Jan 2017 – Advance Fabrication Awarded
- ✓ Jan 2019 – Detail Design & Construction Contract Award
- CVN 80 Keel Laying - Feb 2022
- CVN 80 Launch - Nov 2025
- CVN 81 Keel Laying – Jan 2026
- CVN 80 Delivery – Mar 2028
- CVN 81 Launch – Oct 2029
- CVN 81 Delivery – Feb 2032



CVN 80/81 Contract Signing – 31 Jan 2019



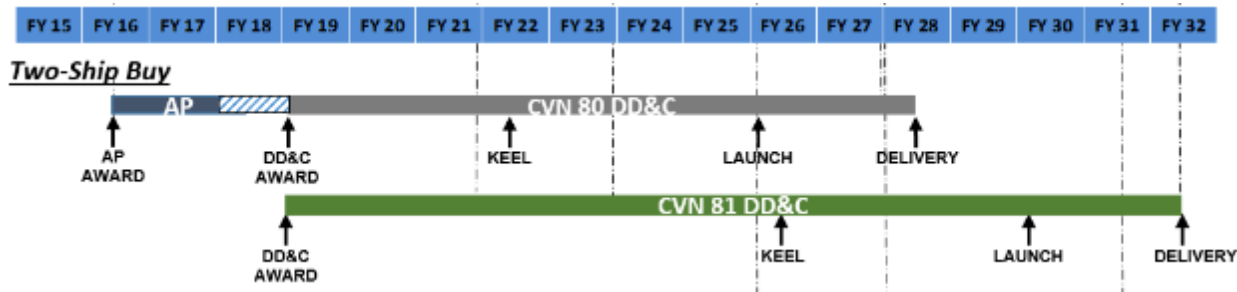
Incorporation of Joint Strike Fighter



First CVN 65 Repurposed Plate on CVN 80

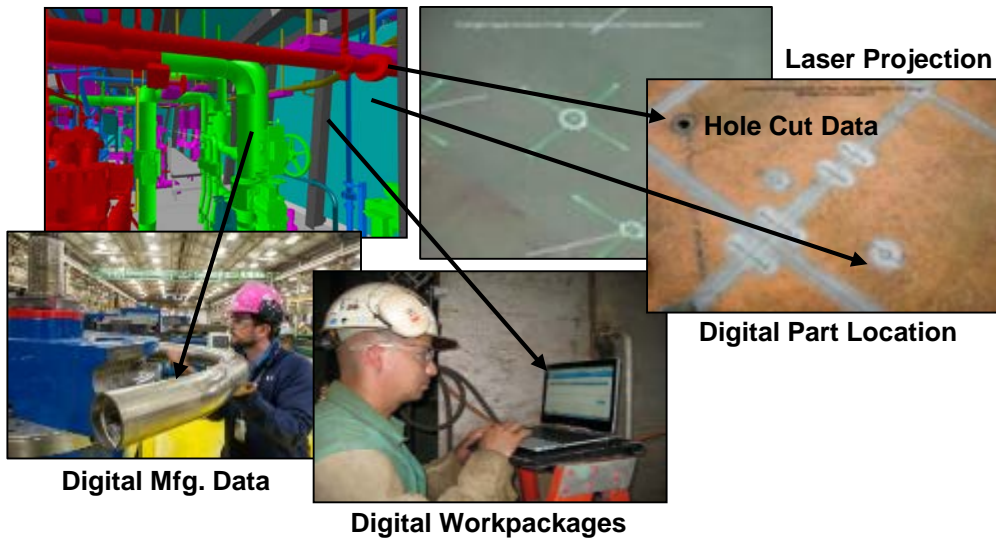


Enterprise (CVN 80) and CVN 81 Two-CVN Benefits



- ✓ **Benefits Industrial Base**
 - Economic Stability to ~130,000 workers across 46 states
 - Accelerated CVN 81 Increases Vendor Base Flexibility
 - Level loads volume, decreases prices
 - Economic Order Quantity benefit with VCS/CLB
 - De-conflict and de-risk CVN, VCS and CLB work

3D Product Model Digitally Translated Directly to the Deckplate



- ✓ **Level loads SY resources**
 - Maximizes Learning
 - 79 to 81 production labor hours equivalent to ~82% learning curve
- ✓ **Maximizes Engineering and Planning Efficiencies: “Plan Once – Build Twice”**
- ✓ **Minimize Inflation/Escalation**
- ✓ **Transition to Integrated Digital Shipbuilding**

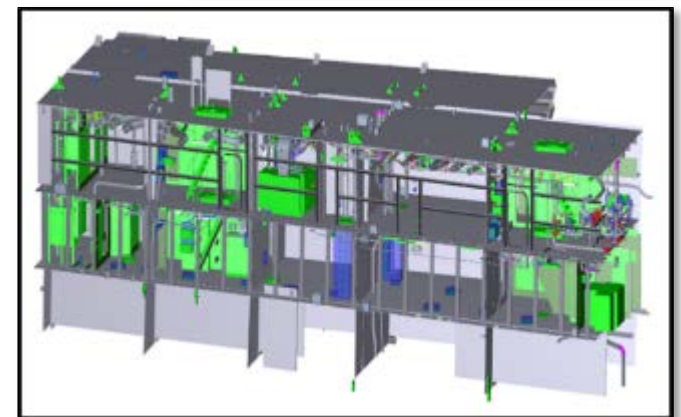
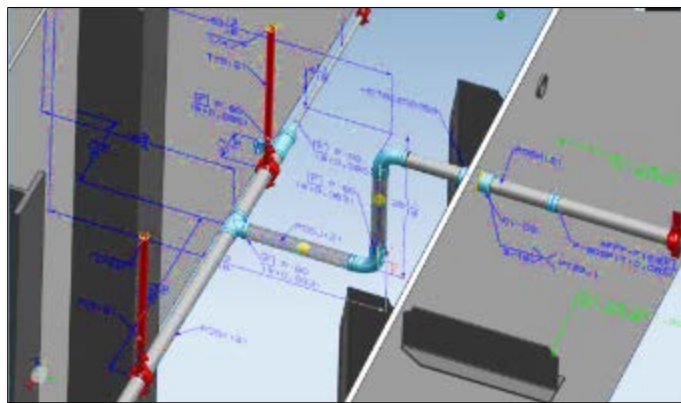
2-CVN Buy delivers unprecedented cost reductions of \$4B – Delivers increased Warfighter capabilities above current FORD baseline design earlier than expected



Integrated Digital Shipbuilding (IDS)



- **IDS** will save significant man-hours on the FORD Class following a one time investment on CVN 80 to populate the tool set
- **Visual Build Management** – integration of 3D model and Critical Chain Project Management concepts to plan complex build sequences, manage material and resources, and track work packages
- **Visual Work Instructions** – provide mechanics with digital, three-dimensional work instructions
- **Manufacturing Processes** – capability to feed digital data directly to machinery, reducing man-hours and improving accuracy from legacy processes





Thank You!

