Surface Navy Association Annual Symposium

John F. Kennedy (CVN 79)
Enterprise (CVN 80) & Unnamed (CVN 81)

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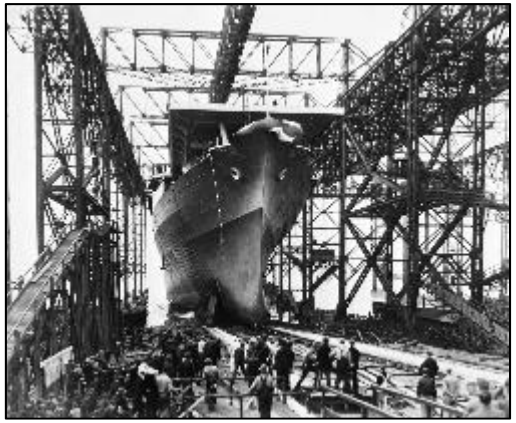
Program Manager

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

16 January 2020

Evolution of Carrier Construction at NNS

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

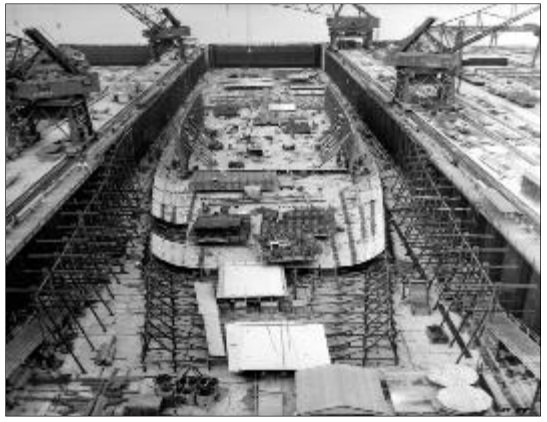


1930s Ranger on Shipway
3 Carriers / >800 Ft / ~25K Tons

Stick-built on Inclined Ways

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

Stick-built in Dry-Dock



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

Stick-built With Some Box Units

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

Steady Evolution of Superlifts

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

Superlifts With Significant Outfitting

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

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)

~7,000 HII Newport News Shipbuilding employees are involved in CVN 78 – CVN 81 construction.

Gerald R. Ford Class
More Capable

NIMITZ Class		FORD Class
4 - Steam	Catapults	4 - Electric
4	Arresting Gear & Barricade	3
4x 200,000 lbs	Aircraft Elevators	3x 200,000 lbs
120	Sustained Sortie Generation Rate	160
4.5 acres	Flight Deck	5 acres
3 Bays	Hangar Deck	2 Bays
9 x 10,500 lbs.	Weapons Elevators	11 x 24,000 lbs.
~ 1500 ft.	Horizontal Weapons Movement Distance	~390 ft.
5,922	Accommodations	4,660
70	Air Wing Size (aircraft)	75
2	Store Elevators	10
6-800 tons	Air Conditioning Plants	9-1100 tons
400,000 Gallons Per Day	Fresh Water Generation	500,000 Gallons Per Day

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

- Christened 7 Dec 2019
- Launched 16 Dec 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)

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

JOHN F. KENNEDY (CVN 79)

- 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

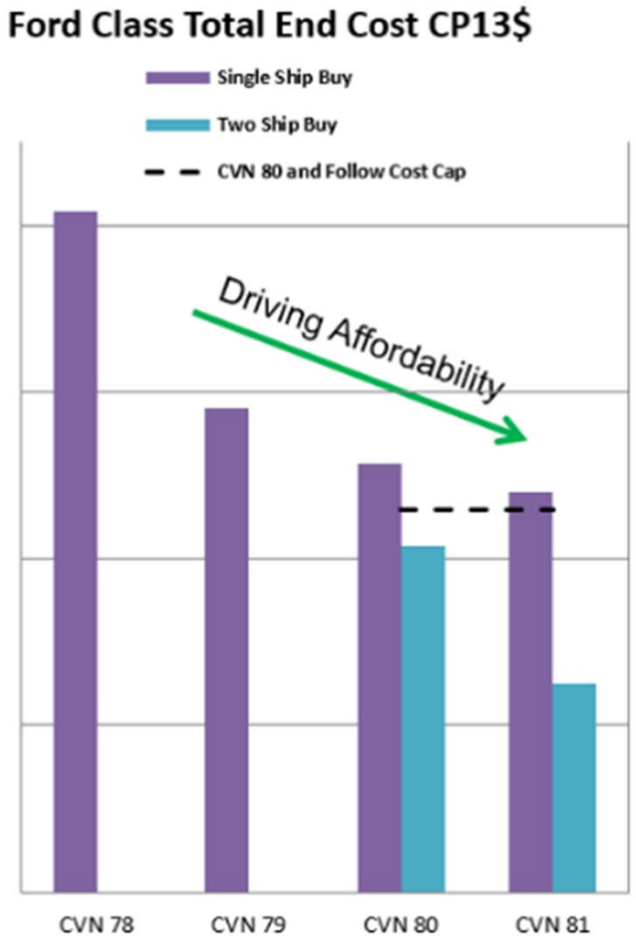
ENTERPRISE (CVN 80) / UNNAMED (CVN 81)

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

Production improvement equivalent to an 82% learning curve

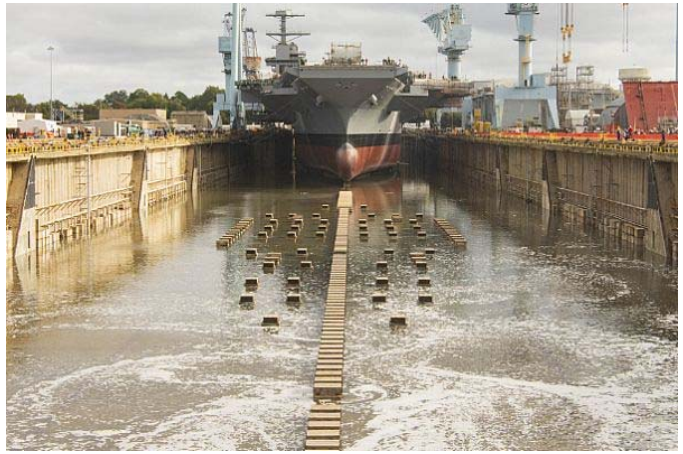
FORD Class Production Efficiencies

Production and Production Related Planning



- **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**

John F. Kennedy (CVN 79)



CVN 79 was launched more than 2 months early

FORD Class Build Strategy

Weather Covers

Unit Outfitting Hall

Facilities Investments

1 Manufacturing Shops
"Components and Assemblies"

2 Steel Fabrication
"Units"

3 Final Assembly Platen
"Superlifts"

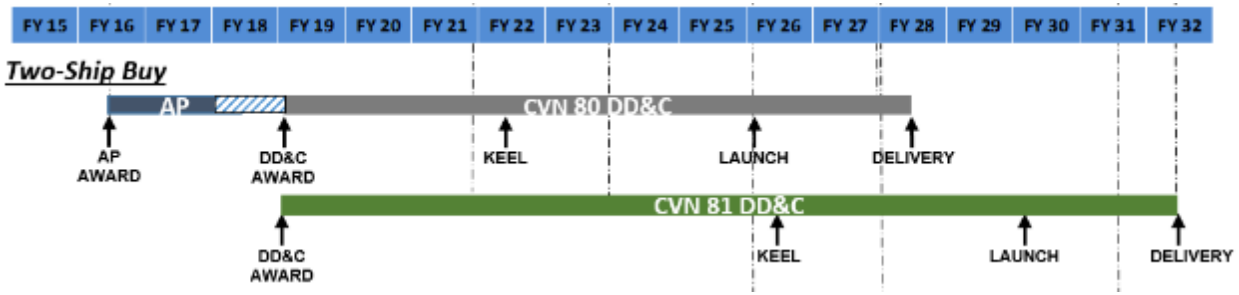
4 Dock and Pier
"Compartments, Systems, Testing"

Efficiency Differences Based on Work Location

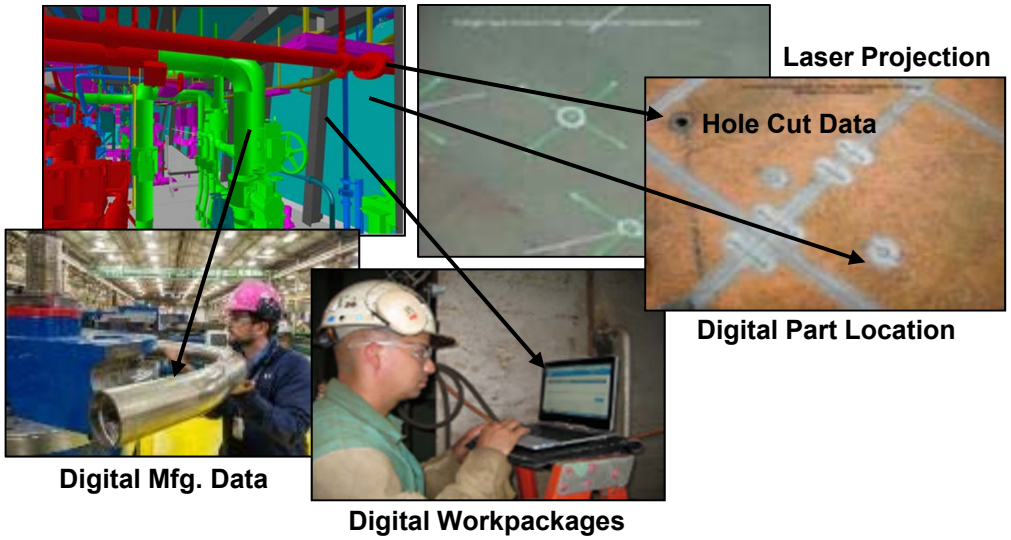
1 Hour in the Shop = 3 hrs on Platen = 8 hrs on Ship

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

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



3D Product Model Digitally Translated Directly to the Deckplate

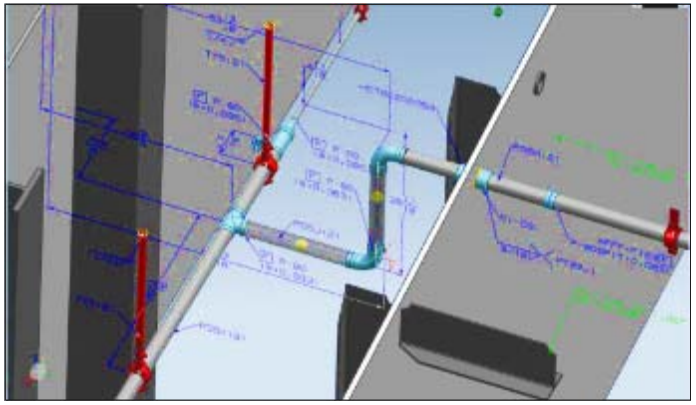


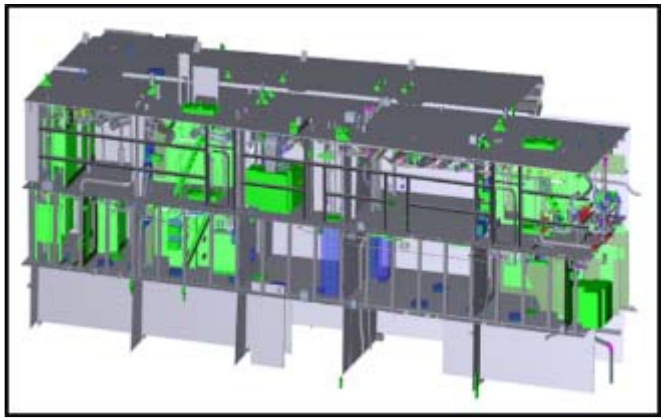
- ✓ **Benefits Industrial Base**
  - Economic Stability to ~130,000 workers across 46 states
  - Accelerated CVN 81 Increases Vendor Base Flexibility
  - Level loads volume, decreases prices
  - Economic Order Quantity benefit with VCS/CLB
  - De-conflict and de-risk CVN, VCS and CLB work
- ✓ **Level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