



What is a “7th Generation” Ultra-deepwater Drillship?

October 17, 2013

Definition of Generations

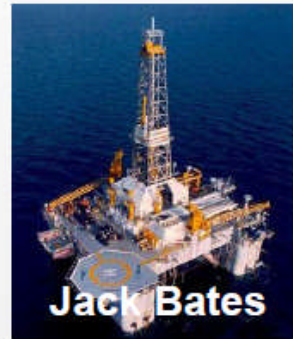
2nd Gen



3rd Gen



4th Gen



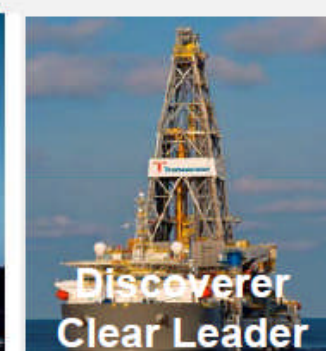
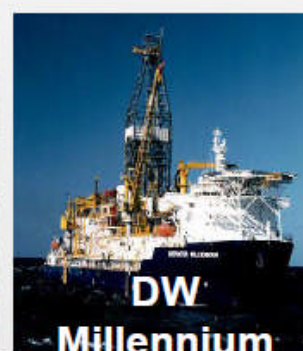
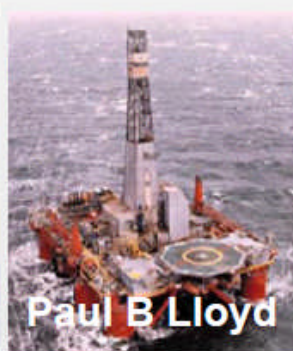
5th Gen



6th Gen



7th Gen



Harsh Environment Moored

Automated Dynamic Positioned

Automated Dynamic Positioned

1969

1980

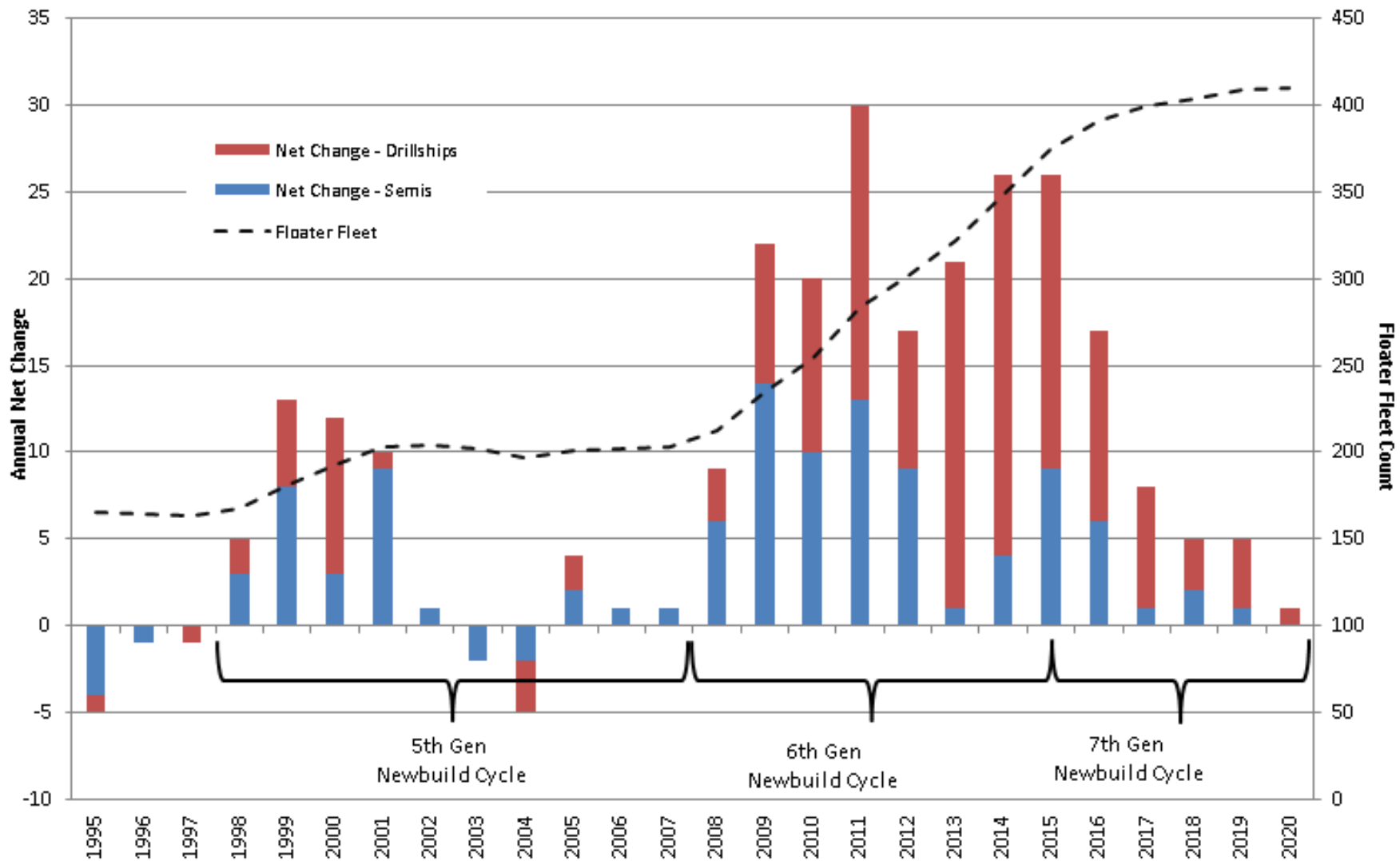
1990

1998

2008

2015

Fleet Growth per Year

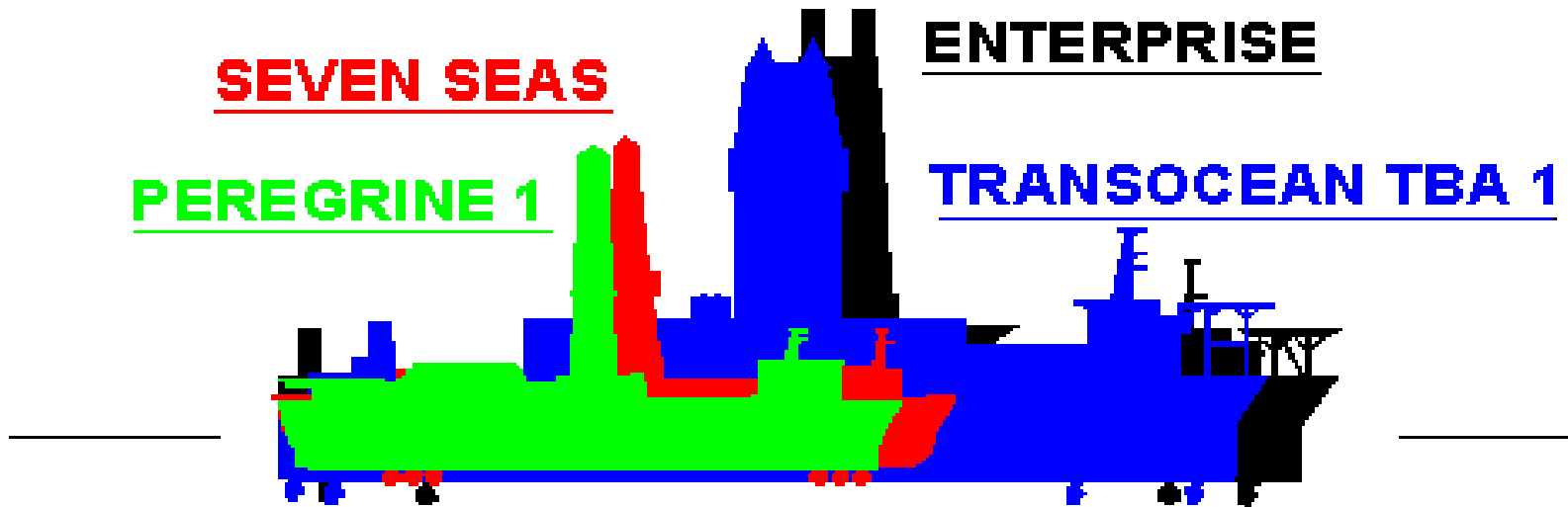


Total fleet in 1998 = 160, by 2020 = 405
Growth > 150%

Increase in drillships versus semi
62% of rigs built since 2005 have been drillships

95 Floaters yet to be delivered

Evolution : Hull Size



Operating Displacement

Semisubmersibles	
Ocean Baroness	39,284 st
Development Driller I	51,250 st
Nautilus	57,969 st
Leiv Eiriksson	58,096 st
West Rigel	66,400 st
Frigstad D90	69,800 st

Drillships	
Peregrine I	19,750 st
Seven Seas	25,230 st
C. R. Luigs	75,000 st
Enterprise / Clear Leader	110,250 st
Pathfinder	113,557 st
Transocean TBA 1	114,640 st



USS Theodore Roosevelt
Nimitz Class
117,200 short tons

Evolution :

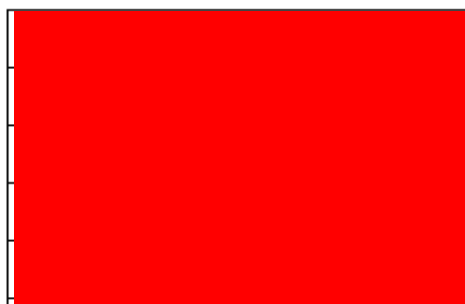

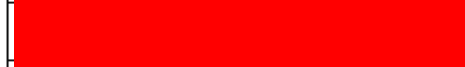
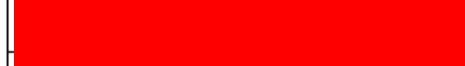
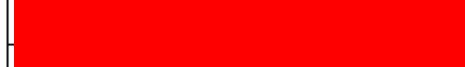
Key Specifications



	Generation						
	1	2	3	4	5	6	7
Water Depth (ft)	135 - 600	600	1,800	5,000	7,500	10 - 12,000	
Drilling Depth (ft)	25,000	25,000	25,000	25,000	35,000	37,000	
Hookload (ST)	200	200	300	300	750	1,140	
No. Mud Pumps	2	2	2 - 3	3	4	4 - 6	5 - 6
Topdrive	No	No	No	Yes	Yes	Yes	Yes
Pipehandling	No	No	No	Yes	Yes	Yes	Yes
Single / Dual Activity	Single	Single	Single	Single	Sing. - Dual	Dual	Dual
HP Mud Pressure	5,000	5,000	5,000	5,000	7500	7500	7500
	1	1	1	1	1 - 2	2	
	4	4	4	4	5	6	
No. BOPs	2*	2*	1 - 2*	1	1	1 - 2	2
	10,000	15,000	15,000	15,000	15,000	15,000	
	No	No	No	No	No	No	
	No	No	No	No	No	No	
Trip Saver Carts	No	No	No	No	Yes	Yes	Yes
Subsea Crane	No	No	No	No	No	Yes	Yes

Evolution : Storage Capacities



	Generation						
	1	2	3	4	5	6	7
	1,450	3,400	3,800	4,078	22,000	22,000	25,350
	1,150	1,982	2,015	5,318	20,000	20,000	25,942
	10,165	8,700	9,484	13,632	13,700	13,700	25,370
	850	1,409	1,286	4,230	5,000	5,000	16,907
	5,000	6,950	7,442	17,297	36,000	36,000	67,120
Base Oil (bbls)	0	2,900	3,161	3,750	9,215	9,215	7,132
Sack Material (sacks)	2,150	3,000	3,000	4,000	16,000	16,000	10,000
Accommodation	84	96	100	120	200	200	200+

7th Generation Marker : Water & Drilling Depth



DRILLING DEPTH

- Drilling depth based on hookload, topdrive torque, and factors for drillpipe to be run and rotated - not a defined criteria
- Wells have been drilled as deep as 39,955 feet in the Gulf of Mexico (40,320 feet from jackup in Qatar).



WATER DEPTH

- Industry shift to drilling & completions in ultra-deepwater.
- Water drilling depth record is 10,411 feet
- The industry will likely continue to move towards 15,000 feet +



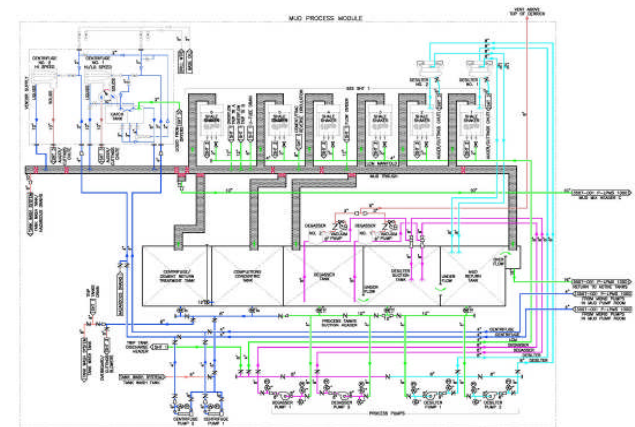
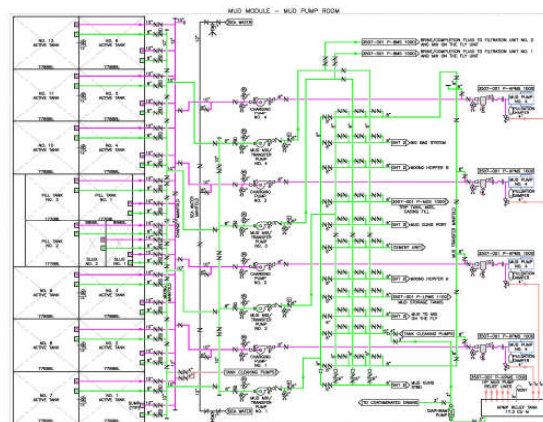
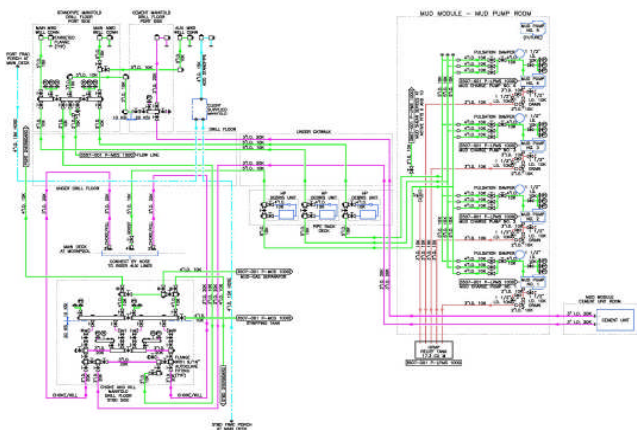
7th Generation Marker : Compensated Hookload



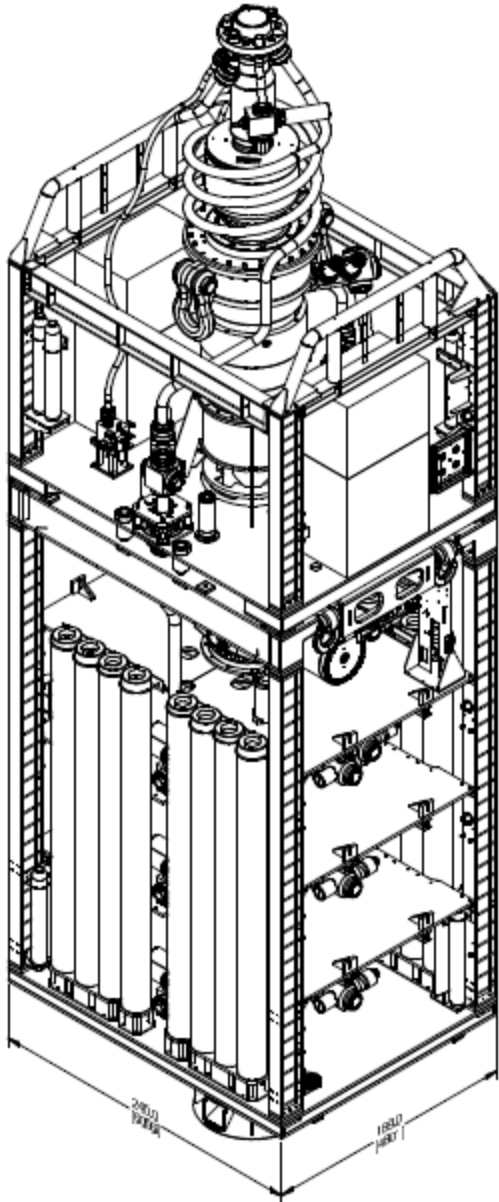
- Hookload rating is defined as the maximum weight that a rig can pickup on its elevators.
- Pre-5th generation limited by rating of the compensator.
- 5th generation rigs with AHD limiting by topdrive.
- 6th generation rigs upgraded to 1,250st topdrives but derricks also at 1,250st which limited the hookload to around 1,140 short tons.
- 7th generation rigs with derrick capacities of 1,400 short tons so hookload capacity of 1,250 short tons is available.

7th Generation Marker : Mud Systems

- Triple liquid mud system has the following components:
 - Dual isolation
 - Triple mixing headers (OBM / WBM / Completion Fluid)
 - Simultaneous handling of three separate fluid systems
 - Tank cleaning and efficient stripping system
 - Double redundant active pit level sensors



7th Generation Marker : BOPs - Rams & 20,000 psi



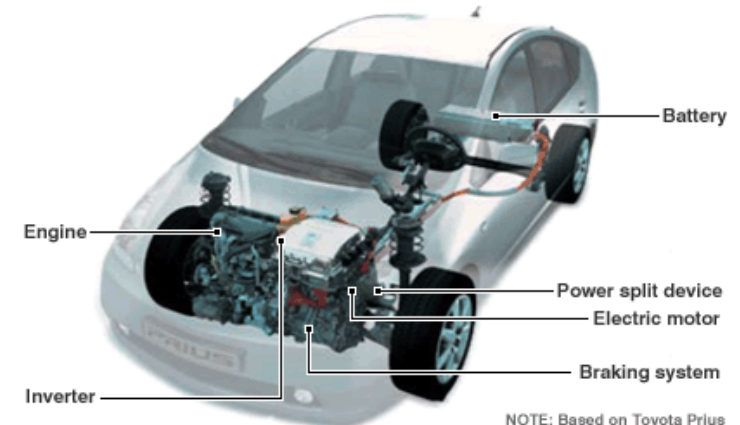
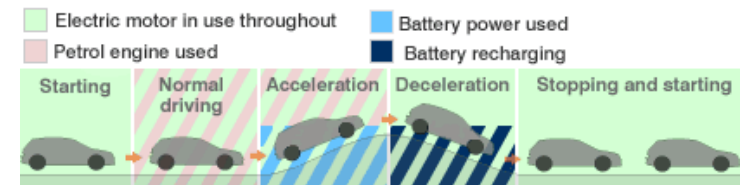
- 7th generation rigs fitted with 7 and 8 rams.
- 7th generation rigs supplied with 15,000psi BOP stacks but some ready to accept 20,000psi BOPs.
- Weight of Cameron 18-3/4" x 20,000psi BOP is circa 532 MT, and dimensions are circa 67-1/2 ft x 20 ft x 15-3/4 ft.
- Surface Choke and kill lines rated for 20,000psi; riser choke and kill lines will have to be upgraded to 20,000psi.

7th Generation Marker : Hybrid Power

- Marine (DP) and hotel loads constant while drilling loads, such as drawworks movements, are variable.
- Hybrid power system will give more efficient loading on generators & engines
 - Constant loading on engines and generators
 - Improved fuel efficiency
 - Reduced emissions
 - Use of exhaust gas cleaning technology
- Power available temporarily during blackout

KEY COMPONENTS OF A HYBRID CAR

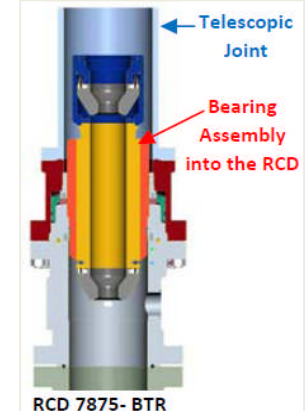
Many hybrid cars cut fuel consumption by combining a petrol engine with additional power sources - such as battery power



7th Generation Marker : Managed Pressure Drilling



- Oil companies seeking alternative drilling techniques to access “difficult” reservoirs.
- MPD includes riser gas handling, annulus pressure control methods, and dual gradient techniques.
- 7th Generation rigs built with integrated MPD equipment or designed ready to accept third party MPD equipment.



- No standard or strict definition for drilling rig generation
- Generation determined by year entering service & key technical features
- 7th generation rig is a rig entering service in 2015 with most of the following technical attributes:
 - *Water depth – 12,000ft*
 - *Drilling Depth – 40,000ft*
 - *Hookload – 1,250 short tons*
 - *Mud capacity – 25,000bbls storage, triple liquid mud system (drillship)*
 - *BOPs – 7 to 8 rams, capable of 20,000 psi upgrade*
 - *Hybrid power - available*
 - *Managed pressure drilling – ready to accept*
 - *Variable deck load - 25,350 short tons (drillship)*
 - *5th & 6th Gen items - Dual activity, 7,500 psi mud system, subsea cranes and trip saver carts*

Thank you for your attention

Any Questions?

