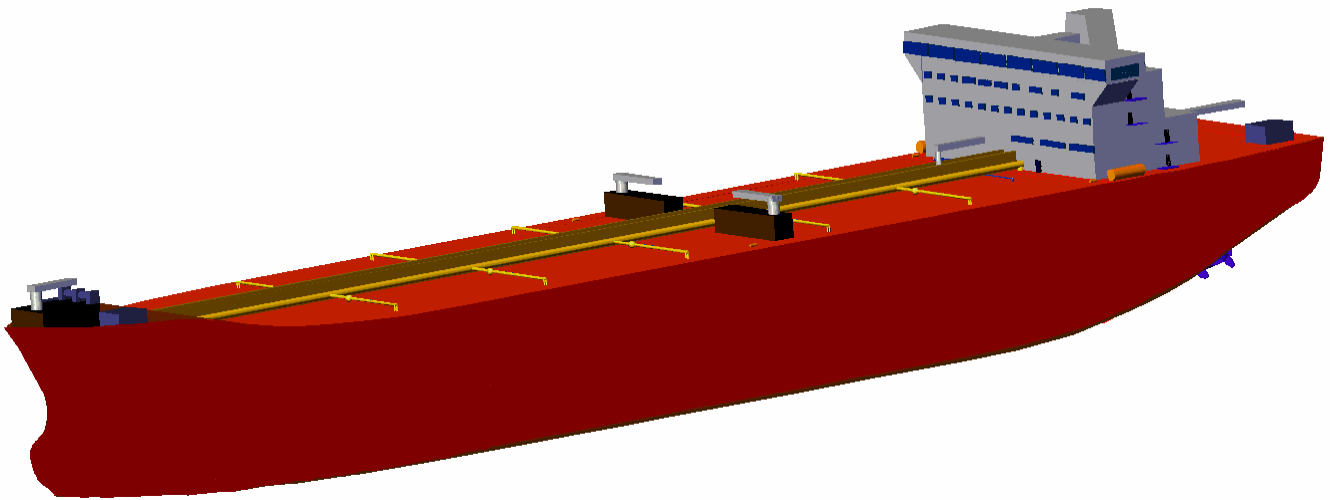


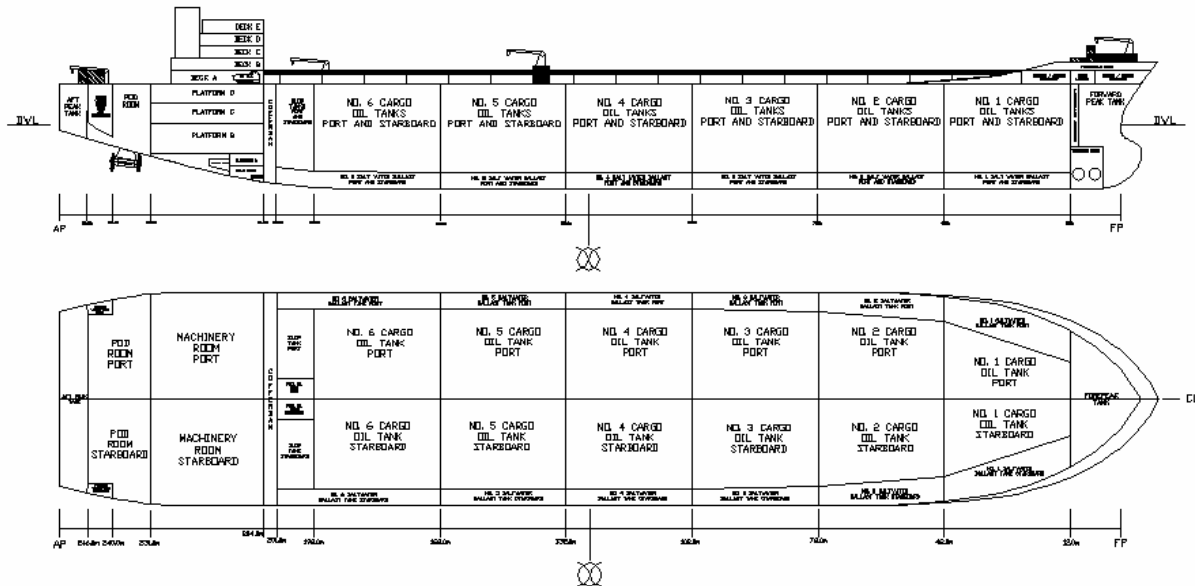
Virginia Tech Shuttle Tanker



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Ocean Engineering Senior Design Project

Executive Summary



The Hibernia Shuttle Tanker’s mission is to load oil from an offshore loading platform located in the Hibernia Oil Field and deliver the oil to either a Trans-Shipment Terminal in Newfoundland, Canada or to various ports on the East and Gulf Coasts of the United States. To optimize the design of the Shuttle Tanker, a structured design approach is utilized. First, trade-off studies are performed to analyze possible design solutions to meet the general requirements. Then, a Pareto Genetic Algorithm is used to identify a variety of feasible ships on a non-dominated frontier to optimize the effectiveness vs. cost of the baseline concept design.

In order to operate in the harsh conditions of the North Atlantic, the Shuttle Tanker has a dynamic positioning system that allows bow-loading capabilities in Sea State 6. The Shuttle Tanker also utilizes an integrated power system with podded propulsion to increase efficiency and maneuverability. To increase safety and decrease the risk of oil outflow, the Shuttle Tanker is ice strengthened and meets the structural requirements of both the American Bureau of Shipping and the Canadian Arctic Shipping Pollution Prevention Regulations. In fact, the ship is designed to survive a collision at 15 knots with a 10,000 tonne iceberg without shell rupture.

One of the main focuses in the design of the Shuttle Tanker is to reduce environmental impact. Hull coatings are chosen to reduce the seepage of heavy metals into the water. In addition to the fuel tanks being placed within the double hull, a large double

bottom height and double side width are utilized to reduce oil outflow in the event of a collision or grounding. The ship is designed with crew safety as one of the top priorities and there is ample life saving and rescue equipment on board. The deckhouse is arranged to optimize convenience for the 28-member crew and be a highly producible structure. Cargo, ballast, bow loading and inert gas are the Shuttle Tankers four main mission systems. The Shuttle Tanker meets or surpasses all the general requirements and does so at a low total ownership cost.

Principal Characteristics

Characteristics	Baseline Value
LBP [m]	252.77
Beam [m]	50.55
Draft [m]	14.87
Cp	0.824
Cx	0.995
Lightweight [MT]	32832
Full load displacement	159832
FL Vertical CG [m]	14.118
Cargo [MT]	125920
Sustained speed [knt]	15
Lead Ship BCC [\$M]	144.2
TOC [\$M]	210.9
Manning	28
Cargo Divisions	6 x 2
OMOE	0.9473