The purpose of this study was to conduct a feasibility-level design and evaluation of the U.S. Navy Next Generation Cruiser, or CG(X). The design of CG(X) incorporates the requirement to fulfill the traditional surface combatant and air dominance roles, replacing the aging Ticonderoga-class ships, as well as new initiatives, such as ballistic missile defense and updated naval technology, to produce a ship to meet the needs of the U.S. Navy for years to come. By testing and evaluating the performance of a feasibility-level CG(X) design, including integrated advanced Naval weapons, propulsion plants and computing environments, significant risk mitigation can be accomplished in the development of the platform, and direction given to advance ship system development. Such early technology integration in the CG(X) design process aids in the expedient fielding of new and next generation Naval weapons and engineering systems. In addition, through using a total-system engineering approach to “optimize” the mix of weapon and shipboard systems for the next generation cruiser, a clearer picture of the possible roles of the CG(X) in the future of Naval warfare can be developed.

Study began with a technology review and trade-off study to define the possible role of current and future weapon systems, to meet the mission needs of the next generation cruiser. Through this trade-off study, three driving factors were delineated to define a field of possible variant ship designs. Unlike previous variant studies, the factors defined for the CG(X) design space included combat capabilities and mission areas. The three design factors were stealth characteristics, ballistic missile defense (BMD) capability and number of Vertical Launch System (VLS) missile cell equivalents. Through the comparison of preliminary designs of 18 variants, using these three parameters as guidance, an “optimized” design was chosen for further development. From an overall comparison of all 18 variants, design lanes were developed to compare the three design factors, in terms of displacement. Through this study, a quantitative assessment of the “cost” (in terms of ship displacement) of stealth characteristics was achieved, from side-by-side comparisons of variants with otherwise identical parameters, but differing stealth features.

The “optimized” variant chosen for the CG(X) design is a flared-hull ship with a low RCS, enclosed deckhouse, representing the threshold stealth characteristics of the design space. She fields 180 missile cell equivalents, the maximum considered among the variants, and is equipped with the enhanced BMD capability, including boost-phase detection with midcourse- and terminal-phase engagement of ballistic missile threats. The ship includes aviation facilities for up to two LAMPS helicopters and/or an Unmanned Aerial Vehicle (UAV) detachment. The ship also fields a multi-mission combat systems suite with extensive sonar capabilities.

The hull is 620 feet between perpendiculars, with a maximum waterline beam of 76 feet. The ship is provided both propulsive and ship’s service power by an integrated electric propulsion system, utilizing three Rolls-Royce MT-30 and one General Electric LM-500 gas turbine engines, to achieve a maximum speed of 31 knots on two shafts with a 4500 nautical mile endurance at a sustained speed of 20 knots and a maximum margined electrical load of 27 MW. The superstructure houses three SPY-2 type (+30 dB) volume search radars, a SPY-3 discriminator, and a full combat communications suite. The ship is equipped to accommodate an embarked commander and staff and a full aviation detachment. The CG(X) lightship displacement is 13,000 long tons (LT), with a full load displacement of 16,250LT.

The ship meets all structural, stability and sea-keeping criteria as set forth by the U.S. Navy. It is designed with regard to the insertion of future technologies, including area to expand the forward missile cells to accommodate larger future missiles, and adequate weight, area and power margin for the upgrade of other combat systems as new technology matures.