Engineering and Design

GENERAL DYNAMICS
Electric Boat
An Engineer in EB’s Research & Development Lab showcases some of their ongoing work.

**ELECTRIC BOAT ENGINEERS** design, build, test and deliver the most complicated machine in the world, that operates in the harshest of environments. Through the expertise, professionalism and dedication of our 4,000+ engineers, designers and support staff, the Electric Boat Engineering and Design Organization is uniquely qualified to solve the most technically challenging problems and develop innovative, effective and affordable solutions. We strive for teamwork and constantly draw on the knowledge and contributions of every individual to ensure we deliver the products that are essential to the security of our nation.

**Our Mission**

To design, build, and support nuclear submarines and the undersea systems that protect America while developing the innovations to ensure submarines remain an enduring asset for global security.

**Our Vision**

We will design, construct, deliver and sustain the world’s most advanced nuclear submarines and undersea systems while pursuing opportunities for growth in naval, nuclear, and other adjacent markets.
CORE VALUES

People

Electric Boat employs the most skilled and experienced workforce in the shipbuilding industry. It is this workforce that enables our company to maintain its outstanding record, continually delivering submarines on time and under budget.

Product

At Electric Boat, we design and build our submarines to protect and serve the brave sailors who use them everyday. The weight of this responsibility is what drives us to make the best product possible.

Performance

Nuclear submarines are one of the most advanced machines on Earth. The high demands placed on our product are reflected by the unwavering commitment to first-time quality and safety to which each employee is committed.

Culture at Electric Boat

KEY TO OUR SUCCESS as a company is the culture we embody: the values we hold, the heroes we look to, the communication we foster, and the rites and rituals we observe. Electric Boat has a long history of tracking employees’ careers as they develop within their roles, and formally marking their progress. We continually seek to cultivate an open cultural network through mentoring, open forums and more, breaking down the communication barriers in our company’s hierarchy. Our heroes, those individuals who stand out as living examples of best practices, embody our core values and leading others to follow their example. We identify our core values and deliver this message to our workers to ensure that everyone is doing their part to help our company to excel.

Mike Gilroy
Chief Engineer

In his role as Electric Boat’s sole Chief Engineer, Mike helps the Engineering and Design Team navigate difficult engineering challenges spanning multiple disciplines. The 34-year veteran of the Fluid Systems group employs his characteristic enthusiasm and expansive knowledge of submarine systems to find the optimal solution amongst competing objectives. Over the coming years, Mike and the Engineering and Design team will continue to develop the design of OHIO Replacement—the next generation ballistic missile submarine—as well as future modifications of VIRGINIA Class submarines.

TOP: The Integrated Product Design Environment is being utilized at Electric Boat. All-electronic data enables the highest levels of data re-use, minimizing errors and maximizing efficiency.

BOTTOM: Electric Boat explores the application of new technologies such as the Computer Assisted Visualization Environment (CAVE), an immersive 3D virtual reality environment.
Engineering expertise is a critical element in supporting waterfront activities and ship deliveries.
The functional design and integration of submarine systems and components, while developing the spatial arrangement of these systems and components, requires an extremely high level of collaboration.

The Design-Build-Sustain philosophy and teams have been instituted at Electric Boat. Beyond the functional and spatial integration of systems and components, Design-Build-Sustain teams ensure that manufacturing best practices (including modular design) are captured via collaboration and Design for Production principles, rules and standards. Operation and maintenance considerations are captured by consulting the operators and maintainers and leveraging guidance from the Design for Sustainment program. The Design-Build-Sustain teams include major area teams to integrate the spatial design and system integration teams to integrate the functional design.
**Concept Formulation**

As the concepts of yesterday have become today’s realities, we continue to understand the needs of our customer to provide innovative solutions that will meet missions of tomorrow.

**Engineering Analysis**

Unmatched high-end engineering analysis capabilities that allow for levels of design optimization enabling some of the most stringent performance and lifecycle requirements to be met.

**Technology Integration**

There are many design partners that support the development of cutting edge design of submarine components, payloads and peripherals. At the end of the day, Electric Boat’s Design and Engineering team develops total solutions that integrate all of these innovative solutions into a cohesive final product – a nuclear submarine with unmatched capabilities.

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**Just nine years**

**ELECTRIC BOAT’S RECORD OF SUCCESS** and national firsts lay the foundation for our future progress. The USS Nautilus was an embodiment of this success. The vessel entered service in 1954 as the first nuclear-powered submarine and was in service for over 25 years. The concept of the nuclear powered submarine was a vision of (then) Captain Hyman G. Rickover and was embraced by an Industry and Navy team. The team went from concept to a prototype of the plant, to design and building of the ship, to sea trials, and then to the operational fleet in just nine years. This amazing feet of technological advances, hard work, decision making, and persistence has been honed into a unique competency at Electric Boat. It enables us to deliver ships that not only meet their mission requirements but also add unforeseen value – surviving collisions, saving sailors lives, and extending service life. Since that time, Electric Boat has continuously and repeatedly exceeded expectations, with programs like OHIO, SEAWOLF, and VIRGINIA Design Build.

**Strength -- Concept through Integration**

**Concept Formulation**

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Challenges - Exceeding Expectations; Now & in the Future

Challenges – Costs

Electric Boat will need to redefine world class to meet the challenges of tomorrow. With a production and operation cost that runs into the billions and with limits to funding from Congress, submarines face scrutiny. Elevating Design for Production capabilities will be critical to solving the coming cost challenges. Design and Engineering costs are also under scrutiny and contractual terms and incentives will reward Electric Boat for improved efficiencies. The new Integrated Product Design Environment (Teamcenter and NX) that is currently being deployed for the OHIO Replacement program and the Vertical Payload Module upgrade create an excellent opportunity to capture this efficiency once the conversion to a new tool and training the workforce is mature.

Challenges – Knowledge Transfer

To continue success and maintain our reputation as the leader in submarine design, Design and Engineering ensure that technical correctness is achieved and all of our products are of the highest quality. Through retirement and attrition, thousands of years of experience leave every year. The knowledge that goes with these people needs to be captured and shared to preserve the knowledge base required to be the best.
A VIRGINIA-class submarine moves on rails out of the 260 building after final assembly.

AS WE CONTINUE to evolve our business, we must be prepared for the challenges that lie ahead and confront those challenges with innovation, creativity, collaboration and urgency. In a complex business environment such as ours with the ever increasing pressures to be affordable, to our nation and our customer, we strive to deliver exceptional results. We continue to improve in all areas to support the submarines we design, engineer, construct and sustain for our country.