

## COLUMBIA-CLASS NUCLEAR SUBMARINE CRITICAL COMPLEX STRUCTURES



### BACKGROUND INFORMATION

Keel Southeast was tasked to manufacture critical complex structures for the U.S. Navy's new Columbia-class nuclear-powered ballistic missile submarines, which are the Navy's top priority.

The new submarines, 12 in total, will be the largest ever built and are intended to replace the Navy's aging Ohio-class submarines.

This submarine, as part of the United States' strategic nuclear deterrence, will enable the Navy to maintain its submarine force levels, which is essential for protecting our warfighters and ensuring global security.

The project, with its lead submarine expected to deliver in 2028, poses numerous challenges. However, Keel has the nuclear navy experience and proven defense manufacturing expertise to successfully execute this program and deliver unrivaled, high-quality components on time.

### BUSINESS CHALLENGES

1

Due to the U.S. Navy's high-priority implementation to the fleet, the program requires a tight schedule. Large material handling equipment is required to complete the sizable components. As a result, existing capability and capacity is required to meet the program deadlines.

2

The customer was seeking an experienced manufacturing staff to complete the complex requirements, which include U.S. military standard (MIL-SPEC)- and Naval Sea Systems Command (NAVSEA)-specified materials and processes. Full-penetration welds require non-destructive testing (NDT) to ensure quality weld joints. Confirmation of overall length and positions are required before delivery to the submarine integrator.

3

Sizable facilities are required to accommodate the magnitude of the Columbia-Class structures. Completed components exceed truckable size and must be barged to their final destination.

## APPROACH AND SOLUTION

Following intensive analysis of the scope of work, the Keel team developed a detailed build sequence plan to effectively accommodate the program's stringent fabrication and welding requirements and delivery timeline, while also addressing the complexity and size of the structures and any anticipated challenges.

In addition to complex machining of subassemblies, the technologies required for this program include a 300-ton heavy transporter and complex forming and rolling, which is achieved via Keel's industry-leading Nieland cold forming press and DAVI Mav-30 press roll equipment that is able to roll steel up to 7" thick.

Our team of certified welders, engineers, and inspectors specialize in making sure every aspect of our work is built to meet NAVSEA's demanding requirements. On-staff NDT technicians – led by Keel's ASNT Level III NDT technician, experienced weld engineers and certified weld inspectors – ensure high-quality, full-penetration welds.

We use advanced techniques and equipment to guarantee that every fabrication, component, and assembly is built with precision and maintain continuous communication with the customer's team.

## VALUE DELIVERED

Keel begins with precise planning to meet stringent deadlines and the complex manufacturing process is organized by Keel's Advanced Planning Excellence Center (APEX). All steps, from procurement to product measurement, are defined for Keel's manufacturing staff by APEX. Each assembly step is scheduled at all Keel plants to ensure available capacity and conformance to the delivery schedule. Concurrently, Keel's purchasing department and supplier development group work with our dependable supply partners to ensure materials are delivered on time and to specifications.

With a large staff of non-destructive technicians, Keel also has the depth and skills to ensure high-quality welded joints in the superstructure components. In addition to having the material lifting/handling equipment required for the sizable structures, our extensive nuclear navy experience and large library of NAVSEA weld procedures make Keel an industry leader for this type of highly specialized welding.

At Keel, we excel in delivering large, mission-critical steel fabrications using advanced welding and construction techniques. Our expertise meets the stringent NAVSEA nuclear requirements, ensuring the safety and reliability of both surface and undersea naval platforms.

Through our well-appointed facilities, state-of-the-art equipment and highly skilled team, Keel has contributed to the construction of Virginia- and Columbia-class submarines, as well as Ford- and Nimitz-class aircraft carriers.

With a commitment to precision and excellence, we provide innovative solutions that support mission-critical naval programs, keeping your projects on course from start to finish.

