



NMC Developing Comprehensive Solution to Improve Performance on Critical Submarine Component

The Navy Metalworking Center (NMC) is leading an effort to develop the necessary manufacturing practice required to implement an improved material that will increase performance and save costs in the maintenance of submarines already in service, as well as the construction of new subs. The Office of Naval Research ManTech Program is sponsoring the project that will enable the implementation of an alternate material for the torpedo tube muzzle door operating linkage.

The torpedo tube muzzle door operating linkage for the Los Angeles (SSN 688) and subsequent classes of Navy submarines include several critical components produced from K-Monel (Ni-Cu-Al) forgings. The components do not function as needed in a corrosive seawater environment and must be replaced after eight years of service. This project seeks to substitute the K-Monel forgings with 15-5PH steel, which provides improved mechanical properties and corrosion resistance, negating the need to replace components during the submarine's lifetime. This project will develop critical forging and heat treating parameters that will result in material properties tailored for this specific application. 15-5PH steel will be evaluated for use on Los Angeles, Ohio, and Seawolf classes of submarines, as well in Virginia Class submarine (VCS) construction.



Substituting 15-5PH forgings for critical components of Navy submarines will improve mechanical properties (NMC Photo)

By eliminating the need to periodically replace these critical components in the in-service fleet, the Navy has estimated the cost savings to be approximately \$9.4M over the remaining life of these 70 hulls. Material cost savings will also result from replacing K-Monel with 15-5PH forgings in approximately 292 tube linkage assemblies on 70 submarines representing four different classes. In addition, a 60-70% material cost savings is projected in the construction of VCS. 15-5PH steel offers mechanical improvements over K-Monel, including approximately 20-30 ksi yield strength and improved corrosion performance in this application.

Upon successful completion of the project, the implementation of the 15-5PH linkage components will begin in VCS new construction, starting in FY11. In addition, retrofit of existing K-Monel linkage components on the Los Angeles, Ohio, and Seawolf classes of submarines will begin in late FY11 after sufficient quantities of machined components are available.

The Integrated Project Team includes the Virginia Class Submarine Program Office, Strategic and Attack Submarine Program Office, Naval Sea Systems Command, NSWCCD and General Dynamics Electric Boat.

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