

Y-12 Work for Others – a historical perspective, part 3

The primary mission of the Y-12 National Security Complex has remained the support of the nation's nuclear weapons program for its entire history. This fact is well understood by all, and those who are familiar with Y-12 know that its primary mission is a unique, demanding, challenging and highly technical endeavor. Y-12's "Can Do" attitude results from doing such a trying and difficult mission and doing it well.

Work for Others benefits from the same "Can Do" spirit, excellence in uranium-related work, and technical expertise that applies to areas outside of weapons work.

The Work for Others program has provided benefits to both Y-12 and the customer. Paul Sooter, who is bringing us this historical perspective on Work for Others at Y-12, identifies some of the main benefits for us.

"Benefits associated with US Navy work in Oak Ridge have been a two way street. Some technologies and methodologies developed by Oak Ridge have become the standard Navy procedures. The Oak Ridge developed process for welding thick (greater than 6" sections) Nickel-Aluminum-Bronze is the basis for the NAVSEA procedure. Oak Ridge developed techniques for installing special materials have become the NAVSEA standard.

"US Navy funded projects have also provided benefits to Oak Ridge. These benefits can be placed in four categories – hardware, modeling & simulation, Computer Numerical Control programming, and materials.

"1. Hardware – One of the benefits to Y-12 has been 'free' access to additional manufacturing hardware. The US Navy provided funding for procurement of several major hardware items as part of the SSN-21 Program. Hardware included:

- a. Dorries Vertical Boring Machine (VBM) – The Dorries VBM also provides unique capability and capacity for Y-12. The 26' diameter rotary table on this \$1.2M machine provides a turning capacity unavailable at most DOE facilities.
- b. Fanamation Coordinate Measuring Machine – Procurement of this large capacity CMM provided Y-12 with the ability to quickly inspect both DOE and WFO related hardware. Although the machine is presently out of service as a result of an obsolete probe head, it could be updated.

"Each of these equipment items is still US Navy property. But the equipment is available for use on DOE/NNSA Defense Programs when not being used for Navy Work for Others.

"2. Modeling and Simulation – The aggressive schedule for completion of the Seawolf Propulsor required Y-12 design personnel to push the state-of-the-art with respect to modeling and simulation technologies.

- a. Work was done with Navy funding to validate algorithms associated with a primary Y-12 Computer Aided Design (CAD) software system. This work assisted the efforts to certify the package for weapons production use.

- b. Oak Ridge personnel participated in Navy testing associated with CAD data transfer between different CAD software systems. This effort provided experience and expertise in data transfer that was applicable to transfer of DOE/NNSA related CAD data.
- c. Utilizing Navy funds, Y-12 developed methodologies for simulating machining and assembly of Seawolf components/assemblies. This work was a precursor to the Model Based Engineering efforts presently under way at Y-12.

“3. Computer Numerical Control Programming – The complex nature of Seawolf components required multi-axis milling to reduce part surface irregularities. In addition, the aggressive schedule required application of machining techniques not previously used at Y-12.

- a. Work was done with Navy funding to certify the CNC programming package for a primary Y-12 CAD software system. This work assisted the efforts to certify the package for weapons production use.
- b. Significant developmental work was done in the area of “lead angle” cutting and novel cutting tools. These developments can reduce cycle time and improve productivity in other manufacturing applications.

“4. Materials – Developmental work was completed as part of the Seawolf Program that provided indirect benefit to Y-12 materials technologies. Both metals and composite/polymeric technologies were addressed.

- a. Y-12 Technology Development personnel developed, tested, and applied unique formulations of adhesives for Seawolf. The methodologies used in this development are applicable to Defense Programs activities.
- b. Machining and welding of a wide variety of metals provided experience and expertise in working with these materials. In some cases the properties of the materials are similar to metals used in Defense Programs activities.
- c. Y-12 capabilities associated with non-destructive evaluation (NDE) of materials and welds were enhanced as a result of developmental work completed during the Seawolf Program.
- d. Machining and NDE of composite materials was required, enhancing these Y-12 capabilities.”

Thanks to Paul for his detailed documentation of the US Navy related Work for Others program over the years.

This series has focused primarily on the US Navy related Work for Others, I am sure there are other “Paul Sooter’s” out there who know about historical aspects of other Work for Others projects that have been a part of Y-12’s history. Please send any information you can provide me to smithdr@y12.doe.gov.