

# White Light Scanning Yields Highly Accurate and Repeatable Measurements of Propulsion Shaft Tapers

**Status:** Pending Implementation

## PROBLEM / OBJECTIVE

Power is applied to submarine and aircraft carrier main propulsion shafts through a tapered connection between the shaft and the inboard coupling. To prevent mismatch, tapers are inspected using taper ring and plug gauges that are heavy and cumbersome. Each taper requires from six to 10 inspections as the taper is carefully shaped to the correct contour. Eight work shifts and up to 66 labor hours can be saved if these gauge inspections are eliminated. In addition, taper gauges cost \$615K per set and must be refurbished every three years at a cost of \$70K. Separate gauges must be used for every ship class. This Navy Metalworking Center project evaluated and adapted white light scanning technology to inspect submarine and aircraft carrier shaft tapers.

## ACCOMPLISHMENTS / PAYOFF

### **Process Improvement:**

The project team investigated several different measurement technologies and technology providers before determining that a white light scanning system offered the best solution for this application. The project team improved a commercially available system by developing features that automatically analyze the data, report results, and project the outline of out-of-specification areas onto the measured part.

### **Implementation and Technology Transfer:**

Pending successful testing, implementation will occur in the second quarter of FY14 as Norfolk Naval Shipyard uses the prototype system delivered to them for evaluation. The other naval shipyards, Portsmouth Naval Shipyard, Pearl Harbor Naval Shipyard, and Puget Sound Naval Shipyard, will also implement the results as the Navy eliminates the current gauge process.

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White light scanning systems can provide rapid and repeatable measurements, which will significantly reduce shipbuilding costs. NMC photo

### **Expected Benefits and Warfighter Impact:**

- Cost savings of more than \$6M by eliminating the purchase of taper inspection gauges.
- Additional cost savings of \$830K per year by eliminating the need to maintain the existing taper gauges.
- Safety benefits by eliminating the need to handle 750-lb gauges.
- More repeatable measurements with more consistent interpretation of results.

## TIME LINE / MILESTONE

Start Date: November 2010  
End Date: April 2014

## FUNDING

Navy ManTech Investment: \$1.1M

## PARTICIPANTS

NAVSEA 05Z22  
NAVSEA 04X  
Naval Surface Warfare Center, Carderock Division  
Norfolk Naval Shipyard  
Portsmouth Naval Shipyard  
Pearl Harbor Naval Shipyard  
Puget Sound Naval Shipyard  
Navy Metalworking Center