



The sum of the parts: Non-destructive testing holds the Navy together

Patrick Tremblay | DCMA Public Affairs

David Reiner, a quality assurance representative with the Defense Contract Management Agency's Navy Special Emphasis Operations, uses special lighting to expose surface imperfections in a fastener at Laboratory Testing, Inc., in Hatfield, Pa. The part has been coated with a liquid then cleaned. The liquid remains in tiny cracks and glows under the lighting. (Photo by Patrick Tremblay, DCMA Public Affairs)

Submarine and surface ships are some of the most complex and costly systems

in the U.S. military's inventory, and they face incredible pressures under the harshest conditions.

The Defense Contract Management Agency's Navy Special Emphasis Operations contract management office ensures that the parts used in these vessels are manufactured, tested and assembled to exacting contract specifications.

David Reiner, an NSEO non-destructive testing quality assurance representative, appreciates his role in validating the strength of our armed forces equipment. He also values the variety in his work.

"It's never the same job every day," said Reiner, who still enjoys his work after 30 years with DCMA. In fact, Reiner sees many parts and pieces of all types move through his primary work place,

Laboratory Testing Inc., in Hatfield, Pa., midway between Allentown and Philadelphia.

The small items Reiner observes being tested leave the contractor to become parts of bigger components. These components will join others, ultimately forming some of the most complex machines in the military's inventory, including aircraft carriers and submarines. Reiner's decades of experience and his dedication to accuracy and consistency are crucial to the warfighter.

"My job," he said, "is to make sure the material that leaves this facility is 100 percent to spec, 100 percent of the time."

For Reiner, it's the structural requirements for the parts, often down to the micro-structure or chemical level, that are important. Some of the parts are tiny, but size doesn't matter, strength does. These are literally the nuts and bolts that

hold the Navy together.

To ensure the customer's stringent requirements are met, Reiner observes inspections which test the limits of parts without destroying them. There are four types of non-destructive testing. Combined, they give a comprehensive picture of a part's surface and subsurface integrity. While the contractor examines the parts, Reiner witnesses the work and certifies the results on behalf of the customer.

Reiner's supervisor Don Landis appreciates the experience and attention to detail that Reiner brings to the job. "Non-destructive testing is important and significant work," said Landis, "and Dave also oversees the mechanical destructive inspection, and the chemical analysis lab for government work."

One type of non-destructive testing, liquid penetrant inspection, employs the



Checking the results of an ultrasonic inspection at Laboratory Testing, Inc., in Hatfield, Pa., David Reiner, a quality assurance representative with the Defense Contract Management Agency's Navy Special Emphasis Operations, utilizes a machine that uses sound waves to measure an item's structural consistency. (Photos by Patrick Tremblay, DCMA Public Affairs)

use of dyes to identify cracks and other surface problems otherwise invisible to the naked eye. Non-porous materials such as metals, plastics, or ceramics are coated with a special dye, and then excess dye is removed. Another chemical or special lighting is used to show remaining dye, which collects in small cracks and surface imperfections.

Another inspection use is the magnetic particle inspection, which only works on magnetic metals. An electric current is passed through the part to be inspected, magnetizing it. Visible ferrous particles, which could be either dry or in a liquid solution, are applied to the part, and they become attracted to any surface imperfections.

While liquid penetrant and magnetic testing allow for the examination of a part's surface, other tests let Reiner and the contractor take a deeper look at the part's structure.

Ultrasonic inspection uses sound waves to measure the uniformity of a material, and can determine minor differences in a pipe's wall thickness or subsurface anomalies in a block of metal.

Radiography inspection uses x-rays to look inside a structure. A standard weld may look perfect on the outside, but radiography can find hidden cracks or

even simple discrepancies in thickness or composition of material, both of which can compromise integrity.

Parts come and go at the testing facility, but NSEO and Reiner make sure that each one receives the consistent attention and meets the requirements demanded by the Navy. ©



David Reiner examines a box of machined components prior to their testing at Laboratory Testing, Inc., in Hatfield, Pa.



Examining a box of machined components prior to their testing, David Reiner witnesses and verifies non-destructive testing of the parts that will become part of a critical component onboard a Navy ship.