



Total Systems Approach Reduces Cost and Downtime for Navy Ship Diesel Engines

The Commander, Naval Surface Forces is responsible for manning, training, equipping, and maintaining all U.S. Navy Surface ships. Keeping ships, destroyers and amphibious squadrons in satisfactory operating condition is a massive effort made more challenging by limited funding available for ship maintenance and repair. Life Cycle Engineering supported NSWC Philadelphia in their effort to provide a more effective approach to diesel engine life cycle management.

The Need

Over time, changes in training, manpower, maintenance and supply processes resulted in high failure rates for diesel engines that power U.S. Navy Surface ships. The result was high maintenance costs and increased engine downtime.

The Solution

LCE supported our customer in the development of a class-specific and total system approach to assessing and maintaining engine health on a continuous basis.

The Benefit

This total system engineering approach, combined with proactive and interactive maintenance support, increased operational availability from 52% to 96%.

High Failure Rates for Diesel Engines Threatened Ship Availability and Mission-Readiness

Over time, changes in training, manpower, maintenance and supply processes resulted in high failure rates for diesel engines. The result was high maintenance costs and increased engine downtime. Many factors contributed to the problem:

- Young sailors were not receiving the in-depth training that was traditionally provided.
- The engine inspection process changed from focusing on safe operation to instead achieving near-perfect engine condition prior to operation.
- Commonality in search of cost reductions resulted in making trade-off decisions for fluid selections that were not optimized for engine performance.
- A shift in the traditional maintenance process to reduced timeframe periods without congruent changes to the work identification and definition process resulted in delays and cost increases.
- Increased complexity of control systems created problems not traditionally seen in diesel engineering.

The operating fleet needed a plan that would overcome these impacts.

Remedying High Failure Rates with a Class-Specific and Total Systems Approach to Assessing and Maintaining Engine Health

LCE supported our customer in the development of a class-specific and total system approach to assessing and maintaining engine health on a



continuous basis. This was a change from the traditional engine internal inspection-only approach to engine condition assessment. LCE helped the customer develop a technical assessment approach built around the entire propulsion train from the ships control console on the bridge down to the propeller. This total system approach to equipment assessment required the development of subject matter experts that were skilled in all areas of the propulsion system, far beyond the usual knowledge of the engine block and attached supporting equipment. Prospective employees were asked to make a five-year commitment to the program to develop the required depth of knowledge and provide the desired long-term stability required for such an approach. Stability was further enhanced by assigning personnel to support one specific chip class throughout the five years of minimum service thus producing a true ship systems expert rather than a “jack of all trades.”

Creating an Expert Team to Implement Best Practices

Working with the customer, LCE hired experienced diesel engine technicians from the Navy and from industry. Navy personnel hired were required to be E-7 or above and have either a DEI certification or have served a tour as an engineering department LCPO. Industry hires were required to have 10 years of field service experience and the required OEM certifications. Hiring a broad range of experts supported our desire to improve our personnel through interactive cross-training.

Working with our government customer and aligning our services on a class basis to mirror the customer’s organization produced personnel well versed in the engine internals, all supporting auxiliary systems, and all electronic and mechanical control systems and networks. This approach also gave our employees an in-depth knowledge of operator requirements. LCE personnel assisted in the implementation of engine combustion monitoring and an off-ship lube oil analysis effort. This support included developing a positive interactive communication with the ships personnel to discuss engine condition, engine performance, oil test results and indications of potential engine problems. Expert-level recommendations were provided to the crew to perform corrective actions early, thereby preventing the possibility of future engine damage.

Simultaneously, LCE engineers working with the customer analyzed issues with supporting equipment, engine fluids, and maintenance practices. This resulted in changes to approved fluids, modifications to operating practices for support equipment, and the development of maintenance standards for common maintenance requirements.

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Additional Information

For more information about improving operational and financial performance, please email us at info@LCE.com or visit www.LCE.com.

About Life Cycle Engineering

[Life Cycle Engineering \(LCE\)](#) provides consulting, engineering, information technology and education solutions that deliver lasting results for private industry, the Department of Defense and other government organizations. The quality, expertise and dedication of our employees enable Life Cycle Engineering to serve as a trusted resource that helps people and organizations to achieve their full potential. Founded in 1976, LCE is headquartered in Charleston, South Carolina with offices across North America and experience around the globe. Follow us on [LinkedIn](#), [Twitter](#) and [YouTube](#) for company updates.

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