

NADEP JAX FINDS COST-EFFECTIVE ERGONOMIC SOLUTION TO ELIMINATE LIFTING PROBLEMS

Aircraft combustion liners are enclosures for the power plant on jet engines where fuel combustion takes place, converting to powerful thrust. The combustion liners are shipped from the fleet to the Engines Receiving Area at Naval Aviation Depot (NADEP) Jacksonville, Florida. The parts are shipped in large cardboard cartons lined with plastic. Once the combustion liner is inserted into the shipping container, the container is injected with expansion-



Aircraft Examiners/Evaluators strained shoulders lifting combustion liners from vacuum-sealed cartons

foam to protect the part from movement or damage during transport. Although each combustion liner weighs less than 40 pounds, lifting one out of its tightly packed container creates a suction effect that can make it a challenge to pull the liner loose from its bulky protective packaging material.

An awkward two-man lift used to be the method for removing combustion liners from their shipping

cartons. Lifting and pulling on the combustion liners triggered shoulder pain in some of the aircraft examiners. Last fall, the production controllers and aircraft examiners who unpack these parts asked NADEP's Ergonomics Team to review their lifting procedure. They asked the team to recommend possible alternatives to avoid shoulder pain and prevent cumulative trauma disorders (CTDs) in employees who routinely unpack combustion liners.

Ergonomics is the science of fitting work tasks to the worker, instead of requiring the worker to adapt to existing working tools and conditions. Tasks that require a worker to use one group of muscles, over and over, for long periods during each day's work shift tend to fatigue those muscles. This overburdening may lead to a CTD, a disability that usually involves weakness and discomfort. Work-related CTDs frequently involve the wrists, arms, shoulders, neck, legs, or back. The discomfort often improves after discontinuing activities that weaken the affected muscles and getting medical treatment for the CTD.

The goal of an ergonomics program is to reduce the frequency and severity of CTDs by redesigning work tasks or workstations to use procedures and tools that minimize the risk of CTDs. Work tasks, equipment, and tools that are ergonomically designed help reduce the risk of work-related injuries and CTDs by making it easier for the worker to avoid repetitive motions, awkward positions, and unnatural postures.

The most obvious solution for unpacking the combustion liners was to drill holes through the shipping cartons and packing materials to release the suction. This solution was quickly rejected. Even if the holes could be placed in a way to guarantee the drill wouldn't damage the liners, the packaging material would be ruined. The material was needed to repackage and return the combustion liners to the fleet after they were repaired.



Cutting open shipping carton releases suction so workers can easily slide out combustion liner

Ergonomics Team members observed how the aircraft examiners removed combustion liners from their containers, considered the special needs of the process, and came up with a simple process improvement. All that was necessary was to release the vacuum and remove the part while keeping an ergonomically neutral posture and exerting minimal force. The Ergonomics Team achieved success with a two-minute, two-dollar procedure that involves cutting open one side of the shipping carton to release the vacuum. The examiner then lowers the cut flap and slides the combustion liner (along with the packing material) out of the carton. The packing material is simply lifted from the combustion liner and put back into the carton and saved for reuse when the combustion liner is ready to be returned to the fleet. During repackaging, the process is reversed, and the cut side of the carton is securely taped. This inexpensive solution takes less time than the previous two-man lift procedure, preserves the packing materials, and virtually eliminates the risk of shoulder injuries and CTDs previously associated with lifting combustion liners out of their shipping containers.

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