

ERGONOMIC CARTS IMPROVE MANAGEMENT OF HYDRAULICS PARTS AT NADEP JAX

Aircraft Examiners and Evaluators (E&Es) play an important role in the Hydraulics and Constant Speed Drive Shops at Naval Aviation Depot (NADEP) Jacksonville, Florida. They evaluate and direct, literally, *tons* of hydraulic actuators, constant speed drives and other parts from military tactical and reconnaissance aircraft during disassembly, repair, and again during reassembly. When taking an aircraft apart for repair, each of its thousands of parts must be accounted for by each shop that handles these parts throughout



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the process, up until the aircraft is ready for final reassembly. It's the only sure way to guarantee that every Navy and Marine Corps aircraft is restored to air worthiness and is delivered back to the fleet, mission-ready and on schedule, every time. Meeting that goal takes a great deal of coordination and skill.

With the onset of the new Manufacturing Resource Planning (MRPII) initiative at NADEP, the workload of a typical E&E tripled because

this new system was designed to track, stage, hold and deliver only *one day's work* into each shop at any time. As a consequence, the E&Es were handling aircraft parts up to three times. First, the E&Es received and examined each part to determine what repair work was needed. Second, the parts were transferred to temporary storage in a *staging area* while awaiting transfer into the appropriate shop for that day's workload. Third, the parts were distributed to the assigned work center for repair. There used to be inadequate room to store the thousands of aircraft parts in the busy Hydraulics Shop work area while the E&Es evaluated and distributed the parts to the appropriate shops for repair.

Lack of adequate storage space and the multiple handling of the same parts were not only inefficient, they increased the risk of worker injuries. Crouching in crowded spaces, workers had to lift parts from flat, metal transport carts that had shelves with raised rims to prevent the loads from sliding off. The shelves were not adjustable, so a worker had to lift the loads over the rim, while still bending or squatting, when retrieving parts from the lower shelves of a cart. Lifting large or heavy hydraulic actuators and other parts over the rims of these transport carts increased the potential for neck, back, and shoulder strains. In addition, lifting and moving these parts multiple times to find and

retrieve other parts increased the risk of cumulative trauma disorders (CTDs) due to awkward postures and motions and overexertion.

This particular NADEP E&E center happened to be on the way to the training room where NADEP's Ergonomics Team routinely met. The NADEP JAX Ergonomics Team is a group of supply and safety technicians, shop employees, engineers, and equipment specialists who meet monthly to reduce the risk of musculoskeletal injuries by improving the fit between workers and their tasks. The team has received training in basic ergonomics, hazard identification, and risk reduction. Ergo Team leader, Barbara Wright, learned about the E&E's challenge, literally, while passing through, and stopped to talk with the workers. She realized there had to be a better, ergonomically sound way to examine, evaluate, and store aircraft hydraulic systems.

Ergonomics is the science of fitting equipment and tools to the worker, instead of requiring the worker to adapt to the work environment. Work tasks that

require using one group of muscles for long periods during each day's work shift tend to fatigue those muscles. This overburdening may lead to a cumulative trauma disorder, or CTD, a disability that usually involves weakness and discomfort. Work-related CTDs commonly 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.



Staging and transfer carts accommodate aircraft parts and fold up for easy storage

The goal of an ergonomics program is to reduce the frequency and severity of CTDs by redesigning work tasks or workstations using procedures and tools that minimize the risk of CTDs. Work tasks, equipment, and tools that are ergonomically designed help to 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.

Ms. Wright and the Ergo Team evaluated the situation in the Hydraulics Constant Speed Drive Shops and concluded that organizing the incoming workload and keeping the parts on mobile carts could reduce the excessive handling, cataloging and storage of the large, awkward, and heavy aircraft

components. The NADEP Ergo Team researched the suitability and availability of recent designs in transport carts. After considering several options, the Team selected a *staging and transfer cart* made of wire with an open front and wide shelves that were deep enough to accommodate most of the parts and parts containers that are processed in the Hydraulics and Constant Speed Drive Shops. Due to limited space in the shops, another attractive feature of these carts is that they can be folded up and moved out of the way when not in use. The NADEP Ergonomics Team recommended these carts to the Hydraulics Shop's process engineer, John Hagadorn, who was responsible for work flow and process design. Mr. Hagadorn was enthusiastic about trying the recommended carts, especially since the NADEP's ergonomics funds were sharing the cost. He ordered 30 carts to experiment with the handling and storage challenge. The initial trial was so successful that more carts were ordered for use in several additional areas at NADEP.

Each *staging and transfer cart* is dedicated to a specific Hydraulics Shop work



area, such as the constant Speed Drive, Disassembly and the Hydraulic Production Control area. E&Es load each transfer cart with items planned for a particular work area, then wheel it directly into that shop. There, the cart serves as temporary staging, holding parts only for one day's workload in that shop. Heavy items are stored on the bottom and middle shelves of the *staging and transfer cart* and are lifted into place from pallets using a

Repair personnel no longer have to crouch to reach aircraft parts, reducing CTDs

floor-to-waist-high lift cart, which eliminates the need for heavy lifting by E&Es and shop technicians. The lift carts are also furnished and paid for by the Ergo Team. Small items that weigh 15 pounds or less are placed on the upper shelves of the *staging and transfer cart*. When they are not in use, the *staging and transfer carts* are folded up and neatly moved out of the way.

Gone are the days when the aircraft examiners, production controllers, and shop workers had to reach, crouch, push and pull to sort through many aircraft parts to find the right one to complete a job. The result has been a decrease in cumulative trauma disorders. There have been substantial decreases in complaints of pain, lost time, and expenses due to injury in the receiving and work areas of the Hydraulics and Constant Speed Drive Shops since the *staging and transfer carts* have been in use. The NADEP Ergonomics Team and E&Es call these carts our *ergo clever-carts*. We think you'll agree.

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