

DoD Ergonomics Working Group NEWS



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H-53 Pitch Control Rod Assembly Fixture: An Ergonomic Solution with the Spin of a Wheel!

The Problem

An ergonomic problem was brought to the attention of Richard Borcicky, Fleet Readiness Center-East ergonomist, on issues involving the H-53 pitch control rod assembly. Operators were suffering with issues of force, posture, repetition, compression, and duration.

Mr. Borcicky called in Scott Holcombe, mechanical engineer, AIR-4.8.4.11 Support Equipment & Special Projects, to address these ergonomic concerns and design a fixture for the H-53 pitch control rod assembly.

H-53 pitch control rod assemblies must be completely disassembled, inspected, and reassembled when being serviced in the depot. It is the disassembly and reassembly process that presents ergonomics issues for the hands and wrists.

Each end of the control rod has a 7/8-32 by 2-inch long fine thread on which a nut and a common body piece are threaded. The nuts and body must be turned by hand for both disassembly and assembly. Frequently during disassembly, threaded parts become "frozen" due to dirt buildup and excessive heat from the aircraft, making them difficult to remove by hand. A standard open-ended wrench may be used to break the parts free, but they must then be turned by hand due to the unique design of the control rod parts.

One turn of the hand and wrist will turn the nut or body by about $\frac{1}{4}$ turn. The total amount by which the nut or body must be turned onto the threads is about $1\frac{1}{2}$ inches. This equates to just under 200 turns of the hand and wrist in order to turn a nut into place. Multiply this by 3 (the two nuts and the body) and there are almost 600 turns required to either assemble or disassemble the parts! This amount of twisting and turning places undue stress on the wrist joints, potentially resulting in carpal tunnel syndrome.

Before the Intervention



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The Solution

An H-53 pitch control rod assembly fixture was developed to eliminate the ergonomic issues associated with control rod assembly operations. The fixture holds the parts securely in place instead of having to hold them by hand or in a vise.

After the Intervention

A wheel (similar to a steering wheel) clamps onto the body of the control rod, allowing the operator to turn the parts with ease and without excessive twisting of the wrists. This also takes the strain off the wrists from having to struggle with “frozen” parts.



A custom deep socket used with a standard socket wrench allows the operator to use a tool to turn the nuts instead of turning by hand—so easy it can be done with just one finger!



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