



NAVAL SEA SYSTEMS COMMAND

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**“Fleet-wide implementation for approximately 15,000 surface ship pump applications will provide annual savings of more than 1700 Sailor-years.”**

## MAGNETIC COUPLINGS

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## Goal:

Improved couplings last longer and are easier to install, align and maintain .

## The Problem:

- Sailors currently spend 29 Sailor-days per year per pump repairing and replacing mechanical seals, couplings, and bearings because of coupling alignment difficulties,
- The greased couplings require quarterly maintenance, and produce as much as three pounds of hazardous waste each year,
- Anytime the coupling is disconnected for pump or motor work requires a complete realignment of the pump and motor shafts.
- Alignments can take up to two full days and depending on application may require cold and hot checks, and
- Re-alignments introduce a shift in the load and wear patterns of the bearings and seals shortening their useable life significantly.

## The Solution:

- Installation of commercial off-the-shelf magnetic couplings eliminates the need for time-consuming alignments, and does not shift the load and wear patterns of the bearings and seals. The coupling accepts up to .25" of misalignment.
- Requires no maintenance and extends life of connected equipment by eliminating the transfer of system vibrations or other harmful overload torque conditions between the pump and motor,
- Eliminates hazardous waste from the periodic greasing of the coupling.
- No shaft-to-shaft physical connection eliminates downtime and expense caused by system lockup and destructive failure. Coupling design allows motor to keep turning if pump seizes for some reason.
- Magnetic properties allow for soft start capability reducing starting current significantly. This feature is particularly advantageous when ship is in a reduced electrical power configuration where limiting high current requirements is a concern.



ELECTRIC CPP USS KAUFFMAN FFG- 59



SWS PUMP USS CARNEY DDG- 64

### Why Does It Work?

This program replaces existing couplings with a new design magnetic coupling, which has an indefinite service life, reduces repair and replacement time, eliminates the hazardous waste stream, and extends the life of seals and bearings because of the unique coupling method and alignment procedure. The soft start features allow for use of less current on start up providing more flexibility in plant alignments when electrical power is limited as well as extending the life of motors.

Fleet-wide implementation for approximately 15,000 surface ship pump applications will provide annual savings of more than 1700 Sailor-years.

### Impact:

- Magnetic couplings last longer and are easier to install, align, and maintain.

**Material:** Precision-machined aluminum rotors containing high-energy permanent magnets are mounted on one shaft, and a hub conductor consisting of a steel housing with copper rings mounts on the other shaft.

**Application:** Saltwater, Fresh Water, CPP, Feed Water, Hydraulic, Chill Water and others.

**Service Life:** Indefinite, installed magnets have a 2000 year

	<b>half-life.</b>
<b>In Service:</b>	<b>Total number replaced: 15</b>
<b>Total Workload Reduction:</b>	<b>.88 Man-years/yr.</b>
<b>Total Cost Avoidance:</b>	<b>\$62.4K</b>

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