

Fishing Vessel Energy Audit Project

To provide vessel owners with practical measures to save fuel, the Alaska Fisheries Development Foundation (AFDF) partnered with Alaska Longline Fishermen's Association (ALFA), Alaska SeaGrant, Nunatak Energetics, and Navis Energy Management Solutions to conduct energy audits and collect data from Alaskan fishing vessels between 2012 and 2017. The information below is provided to help vessel owners identify operational and equipment solutions to improve fuel efficiency tailored to their specific needs.

Improving Hydraulic System Performance

The efficiency of the hydraulic system depends on the condition of the hydraulic pumps and motors, and the amount of heat the system generates when circulating hydraulic fluid. The following are some practical operational and equipment-related strategies to improve hydraulic system performance and save fuel.



Equipment

Hydraulic pumps and motors need to be well maintained for maximum hydraulic efficiency. As the internal parts of hydraulic pumps and motors wear, efficiency is reduced (by up to 50%) and excess heat is generated. Contamination of the hydraulic oil with fine particles or moisture cause wear and is widely recognized as the most frequent cause of hydraulic equipment failure. Proper filtration of hydraulic oil is essential to ensure maximum efficiency and longevity.

Excess heat is generated by worn motors and pumps, undersized hydraulic lines, and fittings that create sharp corners. Large hydraulic systems should have an oil cooler to remove heat and maintain proper hydraulic oil viscosity.

Operating practices

The easiest energy conservation measures (ECMs) to implement are simple changes to operating practices that do not require new equipment. The hydraulic systems on many of the vessels surveyed required 2 to 6 HP to circulate the fluid through the lines without doing useful work. A continuous 6 HP load increases fuel consumption by about 0.3 gallons per hour in a typical diesel engine. This "line loss" accounts for a significant part of the hydraulic load on vessels that use deck equipment intermittently throughout the fishing day. Disengaging the hydraulic pump when the deck equipment is not in use reduces wear and minimizes idle loss.

Simple steps to save fuel:

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- **Filter oil--** Contaminant in hydraulic systems is widely recognized as the most frequent cause of hydraulic equipment wear and failure. Worn pumps and motors are less efficient and generate heat. Pre-season, run the hydraulic system at the dock with a 2-3 micron fine filter installed. After a few hours, change the filter to a 10 micron water absorbing filter for the fishing season.
- **Minimize heat--** Keep lines short, avoid sharp corners, and minimize fittings. Replace worn pumps and motors. Heat and noise are signs of reduced efficiency.
- **Maintain proper oil viscosity—**Improper oil viscosity can reduce system efficiency by 20%. Operate ISO 32 oil around 100 degrees F and ISO 46 around 120 degrees F.
- **Turn off hydraulics when not in use.** Disengage hydraulic pumps when not in use to minimize line loss.

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