

HYDRAULICS FOR SMALL FISHING TRAWLERS

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Unlike big fishing vessels where electric power supply from alternator is available to operate various auxiliaries located any where in the vessel, the small crafts, which constitute over 95% of the total fishing crafts operating in India, are entirely dependent on one source of power, i. e. the main diesel engine. To utilise this source of motive power to operate the winches and other auxiliaries, mechanical drive involving shafts, bearings and pulleys, is inconvenient. The use of hydraulics for such operations seems to be an ideal solution. For instance, one pump may be utilised for operating trawl and anchor winches in parallel. Additional operation of steering system, power blocks, etc. can be achieved by adding few components to the basic system.

BASIC ADVANTAGES OF HYDRAULIC SYSTEM OVER MECHANICAL DRIVE

(i) Hydraulic system is enclosed and more compact compared to mechanical drive from the engine. Actuator (hyd. motor or cylinder) and control valve on deck can be completely enclosed for weather protection.

(ii) No rigid drives are involved and there is no stress on mechanical component due to vibration and buckling of the craft. Hydraulic piping can be laid to suit space

and contour of the structure to cause minimum interference.

(iii) The hydraulic requires the lowest possible reaction time with high starting torque and infinite control of speed, irrespective of engine speed.

(iv) Very little or no maintenance is required for a properly installed system.

(v) System is self protected against overload and would stall against overload without causing failure of mechanical component.

(vi) All components are self lubricated by the fluid medium, hence longer life.

(vii) Engagement of clutch is easier because of inching capability in either direction of rotation.

(viii) Operation is silent, which is a great advantage on modern vessels.

As winch is one of the main equipment needed for fishing operations, the hydraulic system for winch will be discussed in detail.

HYDRAULIC SYSTEM FOR WINCH

The basic hydraulic system consists of :

1. Hydraulic oil reservoir

2. Engine driven pump
3. Relief valve
4. Control valve
5. Counter balance or brake valve
6. Check valve
7. Hydraulic motor
8. Inter-connecting pipes & hoses

A system where the winch is designed for unidirectional operation (for handling only) items 5 & 6 are not required.

Two types of hydraulic systems are in

use at present.

- (a) Low pressure high volume systems
- (b) High pressure low volume systems

Each of the above type of systems has its own advantage and disadvantage. Low pressure high volume systems are preferred by certain European and Japanese concerns, where as high pressure low volume systems are in vogue in USA, and Latin American Countries. High pressure low volume systems are about 25% cheaper than high volume low pressure systems.

COMPARISON BETWEEN HIGH PRESSURE LOW VOLUME AND LOW PRESSURE HIGH VOLUME SYSTEMS

High Pr. Low volume

Cheaper

Lighter

Needs reduction gear
at winch

More accuracy of
components required

Smaller piping

Compact

Easier servicing due
to cartridge construction

Shorter life of fluid
medium

Leakage possibilities more

Low Pr. High Volume

Costlier

Heavier

Needs reduction gear at pump

Does not require much
accuracy

Bigger piping

Bulky

On board servicing difficult

Longer life of fluid medium

Leakage possibilities less.

Considering the above points it is felt that high pressure low volume systems are preferable for small vessels due to restricted space availability.

It is heartening to note that Central Institute of Fisheries Technology has already successfully concluded trials on an indigenous high pressure low volume hydraulic system for a trawl winch operation on a 9.75m. boat. General response is good and it is hoped that soon a good number of boats will be operating hydraulic winches and achieve all the advantages mentioned above.

With the present range of hydraulic

units available within the country it is possible to design winches upto 2 tonnes pull with necessary hauling speed suitable for crafts upto 12.19m. length. Vessels upto 17.5m. can also be equipped with hydraulic winches from indigenous source except for the hydraulic motor, which has to be imported. For vessels beyond 17.5m. length both hydraulic pump and motors are to be imported. However, the rest of the mechanical components of the winch are well within the capacity of present winch manufacturers. This way import of complete winch can be avoided, thereby saving at least 85% of the winch cost in foreign exchange.