

Portable Electronic Warp Load Meter

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A portable type warp load meter has been developed for the use in fishing trawlers. The instrument enables to monitor the warp load in fishing trawlers accurately and easily without disturbing the routine fishing operations. The instrument can be used in several other places like cranes, bollard tests for marine engines, dry docks etc. especially when the operation has to be conducted easily without disturbing the load system. The information displayed in microammeter in the range 0 to 1000 kg can be fed to continuous recorders for detailed analysis and permanent records.

Warp load measurements are required in fishing trawlers for the safe and efficient operation of the underwater trawl system. Any malfunctioning of the net such as improper mouth opening, torn off cod end or entangling the net in underwater objects results in a sudden change in the warp tension either up or down. Ploughing of otter board in mud, will cause an increase in tension. The instrument is also required in experimental fishing operations for proper selection of a trawl net for a boat or vice versa for the most efficient and economic operation. Warp load measurements are usually done with dial gauges, load cells etc. Ordinary load cells and dial gauges cannot be used in many occasions as they require the entire load to be passed through them. For passing the entire tension through the cell, the load should be applied on the hooks on either side of the cells. Usually both the ends of the rope are engaged, one end to the load and other on to the winch, and so the load cell can be attached on the load line only by cutting the wire rope and tying the two ends to the hooks. It can also be done by hooking one end of the load cell to a strong and stable object and the other end to the wire rope bent and made loose from the winch. Both these methods are extremely difficult and also does not help to measure the running load. The above type of operations can be done only by disturbing the entire load system.

Carrothers (1968), Scharfe (1959, 1970), Anon (1967) and Sivadas (1970) have

reported warp load meters where the load is applied fully across their hooks. Lusz (1970), Nicholls (1964), Hamuro & Ishi (1964), Anon (1969) report warp load meters where the load is sensed partially and computed for the full load. There are warp load meters with permanent installations as reported by Anon (1968, 1970, 1972), Drever and Ellis (1968).

Materials and Methods

The transducer of the portable type warp load meter consists of three pulleys as shown in Fig. 1 and it is clipped on to the rope whose tension to be measured. In this condition the rope goes through the three pulleys and the transducer can hang on it without any other support. The pulley at the middle is pushed downwards to a maximum of 1 cm according to the tension. Now the tension 't' by which the spring is compressed down is related to the actual tension T as $t=2T\sin A$, where A is the deflection angle of the rope. The movement of the central pulley is converted to changes in inductance of an electrical coil by means of a mild steel core moving inside it supported by a piston mounted on a good quality spring. The changes in inductance of the coil is communicated to the indicating meter through an ordinary 2-core cable.

The electronic circuit (Fig. 2) consists of an oscillator producing sinusoidal waves at 1kHz. The signal is passed through a buffer amplifier and fed to a half bridge net work with the

