The SeaWise stability monitor

An innovative instrument for the safety of fishing vessels

Hook Marine Ltd, the Ayrshire-based safety engineering company, has concluded a series of tests with its SeaWise real-time stability monitor, designed for the protection and survival of small vessels, in particular fishing vessels.

The tests, which started with model experiments in the wave basin at the University of Edinburgh, were extended and verified with sea trials, using fishing boats of different sizes and types from ports around the UK.

The development of the product was supported by funding from Lloyd's Register Foundation and Trinity House, and by EMFF funds from the Marine Management Organisation.

The SeaWise monitor is now available for installation by fishing vessel owners who wish to enhance the safety of their vessels, and who value long service life from their investments.

The problem

UK statistics indicate that a commercial fisherman is around 115 times more likely to suffer a fatal accident than an average member of the working population. Fishing is simply the most dangerous industry in which to work, and this view is reinforced by the recent Lloyd's Register Foundation report, *'Safety in the Fishing Industry – A Global Safety Challenge'*.

This report states that fatalities worldwide among fishermen are estimated to be 24,000 annually.

In the UK, statistics from the Marine Accident Investigation Branch (MAIB) show that over a 10-year period (2008-2017), some 140 fishing vessels were lost, and 73 fishermen lost their lives.

Hook Marine initially responded to an inquiry from the Department of Transport regarding UK fishing vessel losses, whether in transit to and from the fishing grounds or while engaged in fishing.

Causes of losses at sea

Examination of the causes of accidents, in particular accident reports and statistics published by the MAIB, led to the conclusion that inadequate stability was the root cause of the problem, with many vessels sailing in an unstable condition, even without the additional forces of external loads from cranes or fishing gear being added.

PFDs and their limitations

It is often thought that 'man overboard' incidents are the most common cause of crew members being lost at sea. This has been addressed in recent years by concentrated campaigns to persuade fishermen to wear personal flotation devices (PFDs), and this represents a major increase in safety onboard. But accident statistics show that the majority of lives are lost when a vessel capsizes or founders, so thinking is directed to keeping the vessel afloat rather than relying on liferafts or PFDs. Even when a person is kept afloat by a buoyancy device, the thermal shock of entering cold seawater can prove fatal.

The best lifeboat, therefore, is the fishing boat itself.

So what goes wrong?

Although a vessel may have adequate stability reserves on the day of initial launching, many factors can contribute to a reduction in the metacentric height (GM) as the vessel's working life progresses. Notable changes can take place due to water ingress to the hull, free surface effect due to water on deck or liquid movement in slack tanks, ice accretion on the superstructure, shifting of cargo, overloading, or excess gear stowed onboard.

Modifications carried out on the vessel without any check on the resulting stability change have proved to be particularly dangerous.

The crew of a fishing vessel are therefore faced with a constantly changing loading and stability situation onboard. Quite apart from the above factors, fishing vessels are unique in that they load their cargo of fish in mid-ocean. There is therefore a sound case for regular real-time readings of GM to be observed and logged.

In a recent safety flyer published following the capsize and sinking of a 9.9m fishing vessel, the MAIB commented: "It is important to have a clear understanding of your vessel's stability, but the impact that fishing methods have on stability cannot be emphasised enough."

The flyer also stated that the vessel 'capsized because it did not have sufficient transverse stability to safely lift the contents of its net onboard over the stern. This was primarily because the weight in the net was excessive and the height of the lifting point at the stern was high'.

Although the accident statistics indicate higher levels of risk for smaller vessels under 15m overall length, it should never be assumed that larger vessels cannot suffer from similar problems. In its report, Lloyd's Register Foundation reminds us that 'in developed countries, where a significant proportion of fishing is done using boats of significant size (24m in length and greater), a disproportionate number of fatalities result from the total loss of vessels, often by sinking or capsizing due to insufficient knowledge of real-time stability'.

Early tests of sensors and software were carried out using a wave tank and model.

The SeaWise screen and sensor enclosures.

The SeaWise stability monitor

Roll-testing, carried out in calm water, is a well-known procedure for the estimation of stability on a vessel, measuring the roll period to calculate GM.

The SeaWise stability monitor is designed to use this formula on a continuous basis, while the vessel is at sea.

Depending on the sea state, a vessel will experience many motions in addition to rolling, and the unique features of SeaWise sensors and software allow for these extraneous motions to be discounted, in order to measure the true roll motion of the vessel.

SeaWise has therefore been viewed by many to be a major breakthrough in the most hazardous of work in the marine industry. The device is normally installed onboard a vessel in only a few minutes, and can be fitted in the smallest wheelhouse.

The SeaWise monitor consists of a processor unit with an operator display, and a small enclosure containing the motion sensors connected to it by cable. An additional, optional GPS aerial is provided, should the owner require it.

The display shows the value of GM and the rolling period of the vessel, together with a simple 'traffic light' display which gives a green light during normal operation, a red light when the GM falls below 0.35m, which is the IMO minimum recommended value for a fishing vessel, and also an amber warning light when the GM is declining and is close to reaching 0.35m.

Audible alarm systems should be installed with the SeaWise processor in order to alert crew throughout the vessel, both above and below deck.

Results

The GM value can be presented to the vessel's crew as a spot reading and as a smooth graph, discounting the current sea state.

Ken Smith, director of Hook Marine Ltd, told *Fishing News*: "While we are pleased with the outcome of our development work, the most important factor in its success lies in the hands of others.

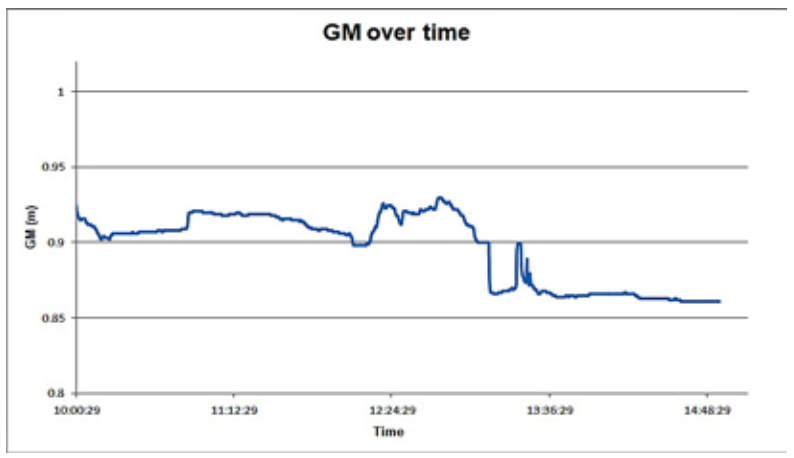
"SeaWise will only benefit the fishing industry when vessel owners and skippers install the product and refer to it as a matter of routine on every voyage. This will realise the real purpose of the device, which is the enhancement of safety onboard, with a resulting reduction in accidents and preservation of life at sea."

Hook Marine looks forward to receiving enquiries from all sharing its commitment to safety. For more information, email: mail@hookmarine.com or go to: **hookmarine.com**

Sea trials included testing onboard a new 24m seine-net vessel.

SeaWise can be fitted easily on a small creel boat.

Even a small wheelhouse can accommodate a SeaWise monitor.



Metacentric height (GM) trace from a creel boat off the northwest coast of Scotland.