

Safety and stability

Second phase of small vessel stability research with catamaran model provides key new evidence that could feed into revisions to MCA code of practice

LAST YEAR, THE Seafarers' Charity and Southampton Marine and Maritime Institute (SMMI) began funding a two-phase collaborative project on small vessel stability by the Wolfson Unit, a commercial marine technology consultancy within the University of Southampton, and the National Federation of Fishermen's Organisations (NFFO) (FN, 14 March, 'Sea state and vessel stability').

Two phases of research have now been completed: phase one, with a model-scale double chine monohull, and phase two, with a model-scale hard chine catamaran. These model vessels were built to the drawings of a 10m potter and a 9m fishing catamaran respectively.

Further grant funding from Research England enabled the Wolfson Unit to increase the scientific value, industry recognition and potential policy impact of phase two by actively involving key fishing industry stakeholders in the project. As a result, the phase two tests were attended by a small crowd, including representatives of the Maritime and Coastguard Agency (MCA), Marine Accident Investigation Branch, NFFO, the Society of Consulting Marine Engineers and Ship Surveyors, The Seafarers' Charity and a UK boatbuilder.

The participants designed selected elements of the test programme, assisted in conducting the tests, provided feedback, made further

By **JULIA GOSLING**

recommendations and validated the final report.

Wolfson Unit engineers are respected leaders in the fields of marine technology and small craft safety, having provided testing and consultancy for ventures in the maritime engineering, naval architecture, yacht design, offshore, sports, aerospace and defence industries since 1967.

The project is being supported by Charles Blyth, the NFFO risk, safety and training lead, and is part of The Seafarers' Charity's strategic partnership with the NFFO aiming to improve fishing safety.

Small fishing vessels undertake low-impact, sustainable fishing activities, but are also the most vulnerable to accidents at sea due to their size relative to the sea state, and are the most likely to capsize due to insufficient stability.

The research by the Wolfson Unit has produced new evidence on the survivability in waves of small fishing craft in relation to stability criteria and the guidance in the current UK Code of Practice for the Safety of Small Fishing Vessels.

Through a series of tests at Southampton University's 138m Boldrewood Towing Tank, the project has investigated various provisions of the code of practice, including minimum freeboard, water freeing arrangements, bulwark height and conditional certification.

It has also assessed the relative survivability of a decked vessel configuration (with a sealed deck and freeing ports) and the equivalent open boat (with deck openings draining to the bilge and no freeing ports).

The project had a twofold objective:

- To establish whether the decked vessel configuration is sufficiently safe from capsizing in waves when operated within a sea state-based allowance, as defined by the Wolfson Stability Method
- To determine the survivability in waves and, therefore, the relative safety from capsizing of the vessel at two configurations: decked and open.

Testing in a tank means you can push model vessels to the limit (and beyond!) in a controlled environment, at known loading conditions and sea states, without risking real boats and real people.

For phase two, the test vessel was selected in discussion with the NFFO, and a two-dimensional definition of the hull was supplied to the Wolfson Unit to enable the construction of the model and the stability calculations.

The scale model was built



▲ The second phase of testing focused on a scale model of a 9m hard chine catamaran, following input from the NFFO. (Photos: Seafish)

out of carbon composite, and load conditions were identified whereby the decked vessel would fail a statutory stability assessment but, according to the Wolfson Stability Method (Marine Guidance Note 526F), could still be operated safely in benign sea states. Physical testing of the decked model in these conditions confirmed the merit of a sea state-based allowance, as all capsize events occurred at combinations of stability and wave height deemed unsafe by the Wolfson Method.

The decked model was then reconfigured as an open boat by blocking up its freeing ports, installing a deck drainage system designed to the current

MCA code of practice, and fitting a bilge pump of the appropriate capacity. The open model was then tested at selected combinations of loading condition and regular wave height to enable a direct comparison with the decked model.

Both the decked and the open model survived such direct comparison tests. However, whilst the open model exhibited adequate stability reserves in the conditions tested, the decked model appeared vulnerable in the same test conditions, due to its low freeboard combined with the unprotected freeing ports.

Further tests were conducted to assess the impact of design

CODE OF PRACTICE FOR SMALL FISHING VESSELS

'We urge the MCA to incorporate our findings'

Charles Blyth said: "I am pleased to announce the completion of this vital research project addressing the justified concerns of the inshore fishing fleet. This initiative was sparked by the challenges posed to under-15m fishing vessels under the recent amendments to the code of practice (MSN 1871).

"It was crucial for our industry to tackle the complex issue of vessel stability thoughtfully and effectively. Collaborating with the internationally respected Wolfson Unit made this possible, and I am grateful for its expertise.

"For many years, the industry has been penalised for 'unauthorised' modifications on existing vessels, so to me, it appeared nonsensical that owners were being forced to modify their vessels beyond intended design, without objective justification.



▲ Charles Blyth.

"Now that our work is complete, we urge the MCA to incorporate our findings and recommendations into future updates of the Code of Practice for Small Fishing Vessels.

"I would also go further than this, encouraging the MCA to consider these findings when assessing existing vessels under the current code of practice. The MCA must accept that the current wording in the code of practice for water-freeing arrangements and low freeboard vessels is wrong, and potentially dangerous.

"We believe these changes will enhance safety, improve vessel stability, and foster a better relationship between vessel owners and regulators, which we know is often very delicate.

"We look forward to seeing positive changes that prioritise safety and support our fishing communities."

“We believe these changes will enhance safety, improve vessel stability, and foster a better relationship between vessel owners and regulators”



▲ Dr Matteo Scarponi, principal consulting engineer at the Wolfson Unit (left), with David Grant of UHI Shetland, sighting the Wolfson freeboard mark on the topsides of the monohull scale model.



▲ Matteo Scarponi adjusts the loading of the monohull model, watched by Iain MacAulay of the Western Isles Fishermen's Association.

features such as non-return flaps applied to the freeing ports (decked model), and the ability of the bilge pumps to clear large amounts of water trapped on deck (open model).

Five recommendations are made in the phase two test report:

1 On low-freeboard decked vessels, protection of the freeing ports by suitable, well-maintained non-return flaps should be encouraged.

2 Official guidance regarding freeing port protection options permitted by the MCA code of practice should be provided to owners, boatbuilders and inspectors.

3 The minimum height of the fixed bulwark of a decked fishing vessel of less than 15m overall length, excluding wires and rails, should be regulated in future revisions of MSN 1871.

4 Future changes to the minimum permitted bulwark height should ensure adequate



▲ Weights on the scale model allowed fine adjustments to be made to simulate different load conditions.

deck protection from green water without compromising the efficient operation of the vessel.

5 The effectiveness of new stability-related measures introduced in future revisions of MSN 1871 should either be supported by recognised national or international standards, or evidenced by calculation or physical testing, as appropriate.

Dr Matteo Scarponi, principal consulting engineer at the Wolfson Unit, said: "The catamaran tests funded by The Seafarers' Charity and Research England demonstrate the potential of an innovative approach to policy-making: one that combines physical testing and the participation of key stakeholders.

"Industry representatives,

regulators and naval architects all contributed to shaping the model test programme and producing new experimental evidence in support of future vessel safety policies for the UK small-scale fishing sector.

"We look forward to contributing to new vessel safety initiatives, and will continue to support the strategic target of 'eliminating preventable deaths in the UK fishing industry by 2027' stated in the Department for Transport's Maritime Safety Action Plan."

It is clear that small-scale vessels all over the world have similar problems to the UK inshore fleet, such as degradation of stability reserves over time and vulnerability to extreme weather events. The lessons learnt here may therefore have positive implications for

fishers worldwide, particularly in developing countries without recognised safety and training standards.

Charles Blyth said: "Earlier this year, I participated in a working group at the Food and Agriculture Organisation of the United Nations where I presented the research findings. The stability reports will also be shared at the next Fishing Industry Safety and Health platform meeting in Cape Town, South Africa in November.

"This research will contribute to developing international guidelines for small-scale fishing vessels."

The research reports on the monohull tests (phase 1) and the catamaran tests (phase 2) are available at: wolfsonunit.com/published-papers-and-articles



▲ A series of tests in Southampton University's 138m Boldrewood Towing Tank allowed a number of the provisions of the MCA code of practice to be explored under different load conditions and in varying sea states.

Models used for Seafish safety training

The models are beautifully accurate constructions, and have not been left in a cupboard to collect dust. The Seafarers' Charity and SMMI invited Seafish to make use of them in their safety training activities.

As a result, on 10 and 11 October, Seafish and the Wolfson Unit 'trained the trainers' with hands-on time in the tank with the models.

Neil McAleese, head of industry workforce issues at Seafish, said: "Seafish has been delighted to support our approved training providers to attend an informative and valuable continuing professional development training event at the Wolfson Unit. We were privileged to see two models funded by The Seafarers' Charity and SMMI, one of which



▲ Seafish approved training providers at last month's event.

we took into the Boldrewood Towing Tank to conduct exercises to understand vessel stability, and ultimately fishing safety, in more detail.

"This was a fantastic experience, and Seafish extends its thanks to all parties involved in making this training event a success."