How safe are you in a lifeboat?

Lifeboats on oil platforms and tankers are released into the water from a great height in freefall. When the boat smacks into the water, the occupants may suffer considerable injury. TNO has been investigating the outcome under various conditions together with the Norwegian oil industry. This has resulted in an improved configuration of the seatbelts, among other things.

Photo: TNO

Lifeboat test in Norway.

‘For many years research has been carried out all over the world into the circumstances in which injuries result from rapid acceleration. This has generated tangible variables that indicate the chance of a specific injury. Sensors built into dummies measure forces, speeds and acceleration, enabling us to be able to specific the consequences of an accident on a scale of minor to fatal,’ explains Rene Corbeij, senior project manager at TNO. Accidents may have a different impact on different parts of the human body. For all the areas where injury may occur – pelvis, abdomen, ribcage, neck and head – the risks have been categorised according to a three-point scale: no, medium or serious risk.

Corbeij and his colleagues have a key role to play in research into the consequences of crashes for occupants of land-based vehicles. They have at their disposal the necessary knowledge of biomechanics and human models as well as ‘human’ dummies and advanced numerical simulation models. Hence the reason why the Norwegian Oil Industry Association asked TNO to investigate how lifeboat occupants fare when they hit the water having been ‘launched’ from an oil platform or a tanker.

SERIOUS INJURY

Corbeij: ‘We dropped two lifeboats in freefall from different heights at different loads. The idea was to set the boat in motion straight from the platform or tanker. We found that once it hits the water, there was an initial horizontal acceleration followed only after by a vertical acceleration and rotation.’

The dummy sensors placed in the lifeboat measured the effects of the blow on different locations on the body. ‘These measurements allowed us to set parameters for the laboratory tests and simulations. Using realistic values for the drop and the height of the waves in combination with various occupation profiles of the boat, our MADYMO simulation software enabled us to create models for the seats and fixed seatbelts. By comparing the dummy measurements we were able to determine the severity of the blow. The risk of serious injury was most significant in the abdomen, head and neck. Therefore, we carried out an optimisation study directly thereafter and developed an improved seatbelt system,’ Corbeij says.

A test method was conceived for one of the crash sleds at the TNO crash test facility to evaluate occupant safety in the lifeboats. Corbeij: ‘That’s much cheaper than tests involving lifeboats in freefall. We used these tests to check out how the seatbelt systems we had optimised performed in practice. They showed that the improvements we had simulated could also be implemented in practice.’

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