Human factor in extremes

The maritime industry often has the focus on the developments and innovations regarding the build of vessels, the electrical adjustments, financing and regulatory factors. What about the people who work on board vessels? What kind of factors do they encounter and what kind of effect does this have on their ability to work? Hein Daanen and Jelte Bos of TNO offer their views and findings on this subject.

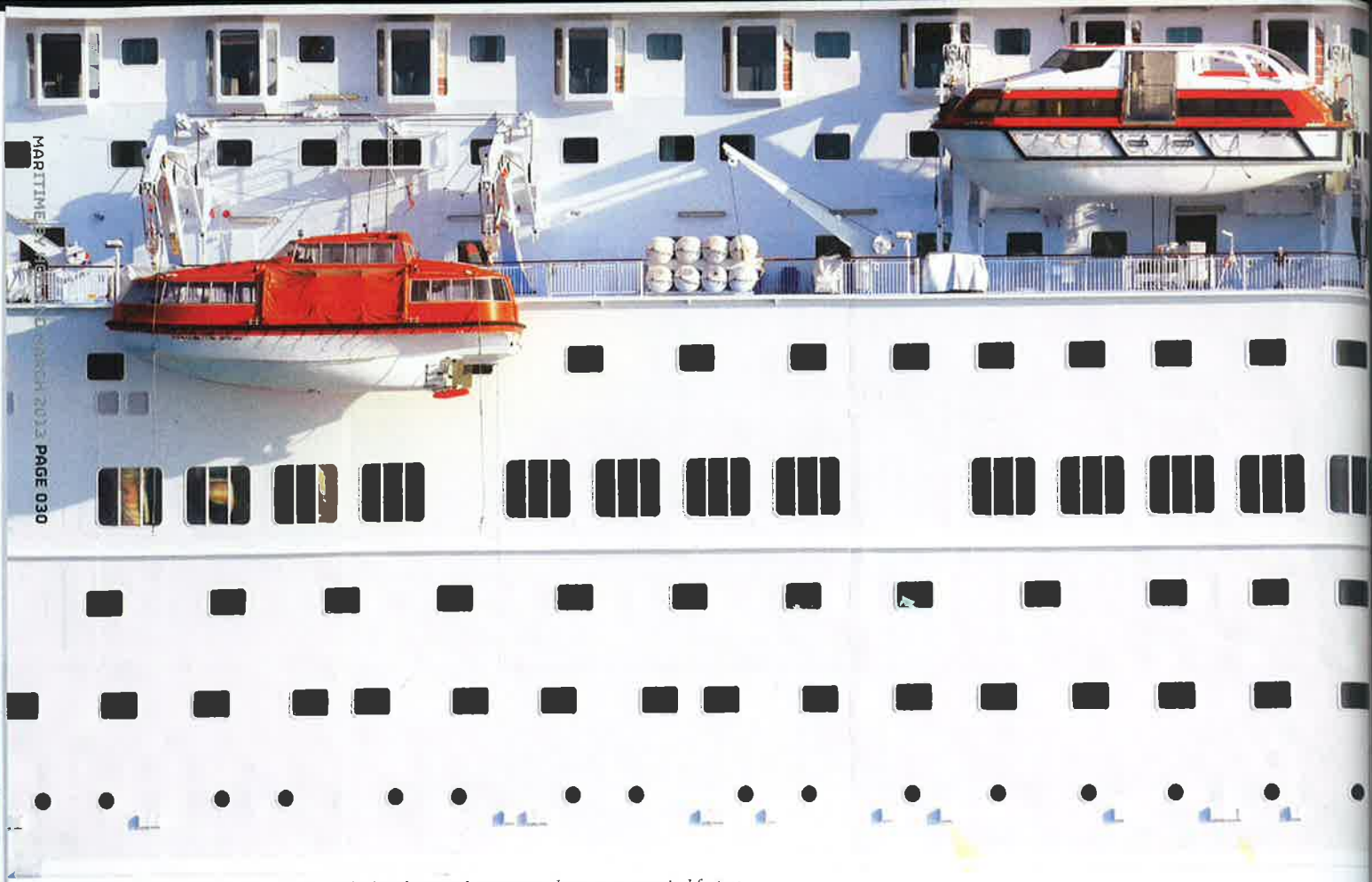
"Many factors can become an 'extreme'", states Daanen, who specialises in what cold does to the human body. "Consider weather, climate, temperature, humidity, sun, wind and movement." Movement is something Bos knows a lot of and defines extreme as all movements that require an employee needing one hand to hold on, leaving one free to fulfill a task. Next to that, you can imagine all strange factors that you would not come across in an office environment or which require clothing to keep you cool or warm.

The Arctic

As we have defined all possibilities of extremes, we can now delve deeper into a recent extreme development: the Arctic. Daanen: "Vessels are now venturing further north, mostly for two reasons. One, global warming has made new shipping routes possible and two, it is very interesting economically as around 30% of the world's natural gas reserves can be found there. The fact of the matter is that we are not made to work in such extreme cold. We are much more tropical people." Cold is one part of the issue. A combination of cold and wind makes the situation much more precarious. Cold can have the same effect on people as ship movement. Daanen: "What can someone do to counter cold? Well, for one we can adjust our body heat, by producing more heat. This can be fatiguing or mean doing more work in a shorter period of time. Another option is to wear clothing that keeps the employee better insulated. Though logically, more clothing can also mean that you are restricted in your movements. Perhaps not always the best option. Extreme cold and wind can cause your flesh to freeze and if you do not protect your eyes, even you corneas could freeze. People suffer from hypothermia sooner in wet cold than in dry cold, because water rapidly removes body heat."

Physical limitations within seasickness

The earlier definition of needing one hand to support yourself and having one hand to do your work may not seem extreme. Yet, it does mean you are 50% less capable of doing the task at hand. Physically there are limitations. Bos: "Seasickness is another extreme factor people rarely think of. You do not just throw up and then get back to your work. It physically impairs



Seasickness can make people unfit to work; therefore vessel movements have an economical factor.

you. It is not a luxury problem as it not only causes you to feel ill, but it can also diminish your sight. You can become unfit to work. Vessel movements, as such, have an economical factor. If you are prone to seasickness the movement of a vessel may influence in which manner you are able to do your job. As such, a company could lose money as the employee cannot work and may need to be replaced."

Hefty emotions

Extreme factors allow for emotional as well as physical malfunctions. Bos: "Seasickness for instance can cause a lack of motivation. This seems simple enough, but what if an accident happens? Will that person have the will to survive of do you feel so ill that you do not care anymore? The will to survive is a very curious thing. Take for instance a life raft of a cruise vessel. The average age on a cruise vessel is around 75. Not to sound condescending, but most people around that age are in the second half of their lives. Their motivation to remain alive when an emergency occurs is much, much lower than someone who is half their age. This has an effect on everyone in the life raft." Both Daanen and Bos agree that the emotional extremes are very important, but have become less important in the eyes of most companies. Perhaps an influence could be the ever increasing multicultural mix of people on board. Each culture has their own way of viewing life and death and each view in turn has an effect. Bos: "Much like when someone is being very passive at work or is perhaps annoyed. Their mood has an effect on you. You could imagine that in a life or death situation, it would be very good to be with a group who value their life and are hopeful about rescue." Bos and Daanen feel that not enough is done by companies to boost morale. The emotional human factor can often be more deciding than a physical one. Bos smiles: "It can be as simple as singing a song together, just to boost morale." Training could perhaps be the way forward to ensure people remain upbeat when the worst happens to them. Daanen: "A ship and her material are sturdy, less breakable machinery. Humans are weak, not in strength, but more in durability. If you want to up their functioning, you will have to do all you can." Think of a life raft with 150 people in it, dangling ten metres above the sea, suddenly being cut loose and crashing into the sea. The crash has such an impact that the lifeboat cracks in half. Do your

first thoughts not go out to the 150 people? The lifeboat can be replaced.

Extreme testing

Knowing the factors and testing them are two very different things. TNO has a testing facility in Soesterberg, the Netherlands. Daanen: "We have wonderful equipment there that allow us to test different climates, winds, heat and humidity. You name it and we can create it." Another portion of information comes from real life accidents. Bos: "It is this combination that makes our test results extremely accurate. A real life situation can be different, as there is no telling what panic does to a human being and how it makes them react. Yet it is our job to work on gaining reliable material and input. Nowadays testing equipment is so small that people can be tested without even realising." Daanen explains that pills can be taken that allow TNO to monitor someone's temperature in the field. Very valuable information that can be used for further research. Bos: "It is all about risk assessment. Of course you would rather do testing in the field, but you do not chance a human life for science."

Vessels venturing further north means thinking of what people working on these vessels can do to counter the cold.

What can be influenced?

"We are often the band aid in a situation", states Bos. "Companies often come to us after they have built a vessel. This sometimes means we have to find solutions that perhaps cannot be used anymore. We would like to be introduced earlier on, preferably when the vessel is being designed. It is not a question of how well the equipment work, well of course it is, but you really have to think of how your employees will be able to work. Hull form and accommodation location do affect seasickness, for example, and knowledge is at hand how to make improvements. Some companies consider this more than others." Both men feel that the government could have more influence in this situation and perhaps this can be done in the future. Economically, humans are very important. Daanen: "Perhaps our influence is most felt in protocols. Our band aid is often used to improve a safety protocol. For instance, for a long time people thought that putting Vaseline on your face would save you from the cold. It actually increases the risk for frostbite. It pleases me when I see this change in safety protocols. People are listening to what we are saying. This is why we do lectures, to inform people. We want to make sailing the seas safer."

Always busy

Daanen and Bos are hard at work on various extreme factors. Bos has finished a European project (SILENV) concentrating on what vibrations do to people and he feels that major steps were taken within the project. Next to that, he has been working on making bridge simulators more effective, commenting: "Flight simulators, as we all know them, not only show the picture, but the movement is also part of the simulation. This is not the case for bridge simulators. In fact, creating motion for airplanes is far more simple than doing so for ships. Though, it is an important part in how people can react to a situation. Think of the extremes where you can only use one hand at sea, while in these simulators you can still use both. We are currently working on how to get the motion equation into the bridge simulator. Did you know, people are far more careful when they feel motion. It is a human defense mechanism."

Daanen is also busy, having just finished a study on surviving in the Arctic and how to improve the buoyancy of life vests. All innovations that could one day safe the lives of people on the brink of an accident. Above all extreme factors, do not forget to remain positive. A sense of hope can give you a warmer feeling than insulating clothing.

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