NINA NO INJURIES NO ACCIDENTS

SAFETY MATTERS

Newsletter from Boskalis

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In this issue:

Mooring and unmooring: a risky part of the work

Operator controls mooring actuator

Mooring and unmooring is a high-risk activity. If things go wrong, the impact is often huge. In this Safety Matters we will present the most recent figures. We will give victims a chance to speak. We will interview several experienced employees: how do they view the risks? And we will make a list of what we can do to reduce the number of incidents during mooring and unmooring.

Last year (June 2013 – June 2014) 114 incidents and near-misses occurred throughout the company during mooring and unmooring. This means that things go (almost) wrong twice every week. Sometimes the consequences are severe: examples are becoming trapped, bone fractures and falling overboard. The SHE-Q department is trying to learn from the report on incidents and near-misses: what is going wrong and why? We provide the vessels with feedback on that information, allowing them to address the subject during their toolbox meetings.

What makes mooring and unmooring a risky business?

1. The forces involved are huge, fed by (partially) unpredictable factors, such as the wind and tide and passing vessels.
2. It's manual labor; inexperienced people often end up at the ropes, simply because it's manual labor, but they are unaware or insufficiently aware of the risks, as a result of which the chances of an incident are higher.
3. Mooring and unmooring requires coordination and cooperation, attention and concentration. However, the operation is not always discussed in detail in advance. And also: what do we do if things turn out differently?

Incident: seaman Marcus Ormaa was severely injured when a hawser broke on board the self-propelled split hopper barge Hans in Kapellskär, Sweden.

The following happened:

Marcus Ormaa explains: *"We were mooring the Hans to the George barge, which in turn was moored onto the Attila backhoe. When we started this, both were stationary. Suddenly, however,*

To be continued on page 2

Continued from page 1

the Attila started up, as a result of which the George made an unexpected movement and the rope between the two boats was pulled tight. I ran away, but the hawser broke and the rope hit my leg with force."

The injury and further developments:
Marcus says: *"My leg was broken. When I was lying on the deck, I was in immense pain and afraid that I would bleed to death. Fortunately my co-workers took good care of me. Vesa Luhtaniemi stayed with me and told me that everything was going to be OK. I was airlifted to the hospital by helicopter. I remained in hospital for a total of seven weeks. Now, three months later, my leg still hurts. I'm using crutches to walk, but I'm confident that I will fully recover."*
Vesa Luhtaniemi, Captain of the Attila: "This was a terrible experience for all of us. Afterwards we immediately held a toolbox meeting to discuss the matter. I have noticed that the men are more careful now, but they still had to learn it the hard way."

Could this incident have been prevented?
Vesa says: *"The accident was caused by an unfortunate combination of circumstances: poor communication, the use of a rope that was too light for this situation, underestimation of the risks. Regarding communication: the Hans only informed the George and assumed that we were listening in on the radio. However, since we were on deck at the time, that was not the case. As a result we started work, unaware of the operation. The lesson learned is to never do anything without explicit permission from the backhoe operator, in accordance with the mooring and unmooring standing order. Never underestimate the forces involved in this."*

Marcus adds: *"Communication should have been better. But I also blame myself for not asking if the Atilla had been informed. And what would've happened if I'd used a thicker rope? We will never know. What I learned was that you must ensure that you are aware of the entire situation and of the risks. That's my advice to co-workers: make sure that you're well informed. Be open, talk about the work and the risks, ask questions if you have doubts. And take care of each other!"*

Henrik Holmberg, SHE-Q Manager Terramare: *"Experience is a key factor for safety. Marcus has been working for us for years, but not as a seaman. What I learned was that we have to pay more attention to the training of people and make them more aware of the risks. Seamen feel responsible for their work – mooring – but they must immediately leave their work if the rope pulls tight. That switchover can be difficult. During training you can discuss this and emphasize that the responsibility for their own safety has priority if things go wrong."*

Vesa Luhtaniemi and Henrik Holmberg

What are the key incidents with hawsers and lines?

1. A line/hawser breaks; the recoil may cause life-threatening injuries to a person standing in the *line of fire.*
2. Fingers and hands getting trapped, for example, when the hawser is placed over the bollard.

Incident: Engineer Rick van de Berg got his foot trapped in a hawser when mooring the Smit Japan in Schiedam, the Netherlands.

The following happened:
Rick explains: *"After placing the aft hawser around the bollard, the boat moved away from the jetty to go forward in front of the fore hawser and the shore connection. At that moment I felt the hawser move along my ankle. When I looked down, I turned out to be standing in the twisted hawser. I tried to pull my foot out, but couldn't do that any longer. Captain Gijs Verdoold saw what happened and immediately turned the stern towards the jetty. But he couldn't prevent the hawser from being pulled tight due to the huge forces and dragging my leg along."*

The injury and further developments:
Rick says: *"I thought it wasn't that bad: I could move my foot, so nothing was broken." Later on it turned out to be a bit more complicated (deep wounds, torn Achilles tendon, twisted knee). Because of the persistent pain, Rick has been unable to work for almost a year.*

Could this incident have been prevented?
Opinions on this differ. Rick himself says: "As in 99.99% of the cases, this accident could have been prevented by paying attention and watching where I was going."
Captain Gijs Verdoold is milder: *"This was simply bad luck. Rick is an experienced man. But the situation was confusing: because a nearby harbor was being renovated, another vessel was moored at the same jetty, with its own ropes. Additionally, our vessel hadn't been operating for that long, so none of the ropes were the right size and we used a double rope instead. Add to that the limited space on the jetty and an accident isn't far away."*
Clearly this activity demands a great deal of attention and communication.

Why do a relatively large number of incidents occur during mooring and unmooring? And what can we do about this?

Cause 1: (Lack of) expertise:
Working with lines, hawsers and winches in general, and mooring and unmooring in particular, requires expertise. This expertise is also required to be able to estimate the risks involved. More than enough of the required expertise is available within the organization, says Marc Schwan (SHE-Q Manager). *"Things go wrong because this knowledge and experience are not always available at the right location. This may be because we (have to) work with local men, who have little or no experience and are therefore unable to judge the risks. But the permanent employees working on deck may also have a lack of targeted training in this field."*

Solution: Knowledge sharing
Safety Coaches. Mark Schwan: *"In Australia, Boskalis worked with two safety coaches, who were side-by-side on deck with the men to show them and let them feel where the risks are. These were men with vast practical experience, a maritime supervisor and a boatmaster, people whose word you believe. I'm also personally involved in this form of professional coaching and have noticed how effective it can be. My advice is to pay more attention to this on the vessels. Deck supervisors, for example, could take on these kinds of coaching tasks."*

On-the-job training.

Jurriaan Guljé, SHE-Q Manager Fleet Management: *"I believe that training is highly important, both for learning the profession and for learning to judge the risks, for your own safety and that of your co-workers. This is why we at SHE-Q regularly promote on-the-job training for everybody. In this case one option would be a kind of mooring and unmooring 'masterclass' by the Captain together with the Boatswain. A very practical question: how to lay a hawser around a bollard? What should you pay attention to? Why? Where should and shouldn't you stand? And what do you do if things are about to go wrong?"*

Teamwork and time

Captain Gijs Verdoold: *"Working with hawsers remains a risky part of the work; you must always be careful. What it comes down to is teamwork. The better you can work together, the safer things get. I believe that safety is under pressure due to the way in which crews are now organized – a small crew, no longer using the basic principle of a permanent man at a permanent location and due to the hiring of temporary workers. We have a crew of three on my vessel. I always hope that I'm sailing with one permanent man, who can provide instructions on deck and can point out the risks to novices. My own approach is always to maneuver carefully, shoot the line calmly, use a hook if possible and prevent running and jumping. Taking your time, that's what I want to convey."*

Cause 2: Insufficient preparation
The mooring and unmooring procedure requires good collaboration of the crew. Now that crews are becoming smaller, it is even more important to communicate well and to know what everybody is doing. Otherwise things can go wrong.

Solution: proper toolbox talk
During a brief toolbox talk before the operation, the captain discusses the procedure with the complete team in question: who will be doing what, when and why will we be doing it like that? To provide a guideline for these, the SHE-Q department of Fleet Management has developed ***toolbox cards.*** Jurriaan Guljé: *"The toolbox cards are a result of the risk assessment. In it control measures are defined for high-risk activities, such as mooring and unmooring. However, if this risk assessment then remains on the shelf, this exercise will miss its target: the man at the hawsers will not be aware of the measures that were devised, which are so important to him in particular. That is why we will be re-specifying the risk assessments with the captains and the crew, and distilling a number of control measures from them, which apply to everybody. We will incorporate these into toolbox cards. I expect the first toolbox cards to be sent to the vessels in August."*

Raising awareness

Captain Vesa Luhtaniemi: *"Young or inexperienced people underestimate the risks of the work. When I tell them that a hawser may break and injure them they say 'yeah, sure', and continue their work. To confront them with the risks, it would be a good idea to have a training video that shows the impact of the forces. That leaves an impression during a toolbox talk! It would also be a good idea to put a kind of warning on top of the bollards. All of this to make them aware of the dangers."*

The mooring operations standing order
is the only one that is mandatory for all vessels. It is included in Q-Aid (EQP-010i). The Cyprus and UK Code of Safe Working Practice also include rules for mooring and unmooring.
See also the Safety Instructions, Section 8.

Cause 3: No clear stop procedure

An analysis of the accidents has shown that the danger is great if the operation does not go as planned.
Jurriaan Guljé: *"Those are the moments that lines and hawsers can break. We have seen really major incidents happen here, with very severe injuries."*

Solution: Discuss the stop procedure together

Clearly discuss what should be done if the operation is no longer safe, if things go differently than planned and discussed in advance. NINA also plays a role here: if you see that something isn't safe, take action.

Mooring and unmooring safely?!

When mooring and unmooring, so many things happen at once that many things can go wrong. Due to the **huge forces** involved, a line may break, as a result of which someone may be severely injured. Due to inexperience or a **lack of cooperation** someone's fingers may become trapped when fastening a hawser. **A lack of attention** may result in someone stepping into a hawser and falling over. **Underestimating the risks** can be fatal. A lot of things can go wrong, because engineering, procedures and behavior come together in this area in particular. That is why, of all things, mooring and unmooring is an activity that requires **communication, checking and coordination.** Make sure that **expertise** is available in the right place and at the right time, to inform inexperienced people of the risks. Make sure that the **equipment complies with the standard. Prepare the procedure.** And make sure that everybody knows what he should be doing, also **if things (are about to) go wrong: STOP.**

Technical innovations

New technology is constantly being developed. Technical innovations can mean a lot for safety. For example, innovations in the field of hawsers themselves. But that's not all. Boskalis is developing a method to mechanize mooring and unmooring.

Innovation: Dyneema

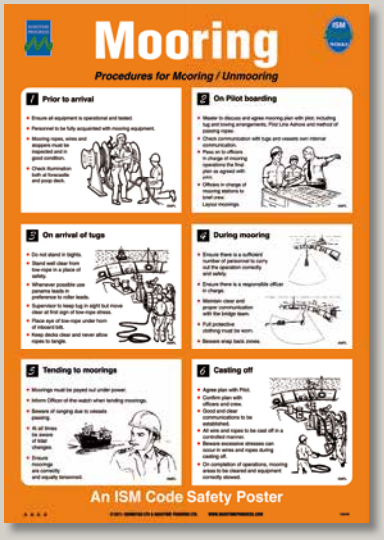
Hawsers and lines form a world of their own, with elastic cables, steel cables and Dyneema. Dyneema is a relatively new material with a lot of advantages: it is just as strong as a steel cable, but it floats, it is much lighter than steel cable and therefore more ergonomic to use, and does not have that much recoil when it breaks. There are disadvantages as well: it is expensive and easy to damage. When used inexpertly (rubbing along a sharp surface, winding over a sheave full of burrs), it will quickly start to fray.

The question is: when to choose a certain type of hawser and why? On request, the Purchasing department will advise captains on this or will put them into contact with an expert inside or outside of the organization. Maurice Koerts, Senior Buyer General: *"We want to share the knowledge available within the organization and progress together as a result. That is why we set up a contact group last year, consisting of engineers, operational managers, safety experts and purchasers from the various business units. Together we recently visited DSM, which produces the raw materials for Dyneema. They are highly focused on innovation, fostered by feedback from users worldwide. New coatings are being developed, which make the rope much stronger and more durable. But it still remains a relatively fragile material; if the chain of people working with it respects that, you can make good use of Dyneema."*

Operator controls mooring actuator

Innovation: Mooring Actuator

The best way to prevent incidents during mooring and unmooring is to mechanize the process. No more people on the boat, no more hands at the hawser. That's the idea behind the mooring actuator, which has been designed



Useful:

poster with mooring procedure

A poster has been developed, covering the mooring and unmooring procedure in six steps. The 'mooring/unmooring' poster is available from ***customer.support@boskalis.com.***

for mooring and unmooring workboats in collaboration with people from the fleet. The mooring actuator consists of an arm and two CT winches, and can be controlled with a remote control. A hook is attached to the end of the arm, which can pick up the cable. The arm, with the cable, then moves towards the workboat, to place it over the bollard. The latter part was the greatest obstacle in the design process, explains Application Engineer and inventor Bas Veenstra.
"In the end we chose a completely new shape: a ball that is placed behind a v-shaped bollard. These special bollards can be easily welded on next to the traditional bollards. Thanks to the CT winches, the wire is never pulled tight."

The mooring actuator was installed on the backhoe dredger Wodan for a test period of one year. The Master and First Operator completed a brief training to operate this new equipment. The initial findings are positive: apart from the fact that this working method is considerably safer, it turns out that mooring is also faster. Bram Geluk, Master on de Wodan: *"From a safety viewpoint it's great that people no longer have to grab hawsers in the gangways (which are sometimes frozen and slippery) or throw them to the workboats, which are much higher up than the Wodan. We are also saving a lot of time: usually it takes us 10 to 15 minutes to moor, now it's two to three minutes. Due to the constant tension the workboat remains firmly alongside, reducing the risk of damage and the wear and tear on the hawser."*

The importance of knowledge sharing

Incidents were the reason for Dockwise to pay special attention to mooring and unmooring last year. Thematic audits were developed especially for this purpose, focusing on the engineering, the procedure and the behavior of people.

Dockwise has outsourced fleet management (ship management) to the external organization Anglo Eastern, operating from Hong Kong. They take care of the audits; the auditors observe the complete mooring operations (mooring area, equipment, workboats, personnel, toolbox talks). Their reports on this are analyzed and shared with the vessels. At a later stage the lessons learned will be incorporated in a training module, aimed at increasing both knowledge and safety awareness.

By now audits have been performed on five out of the 17 vessels. Anglo Eastern SHE-Q Manager Shashi Khanna explains which trends were found: *"We have noticed that the technical aspects, such as the winches and hawsers, are generally in order. This also applies to the procedures. The areas in which things can be improved in particular are the* ***soft skills,*** *behavior."*

A few trends:
- **Not every team leader organizes a toolbox talk prior to the operation.**
- **The content/quality of the toolbox talks varies widely.**
- **Not all workers are aware of the risks.**
- **Workers are still not warning each other enough for/in potentially hazardous situations.**

The experiences from these audits are recognizable for the entire organization and underscore the importance of knowledge sharing and the NINA values, such as confronting each other on unsafe behavior. Caring for each other is the common denominator.

Did you know...

...a new spooler has been developed?

The spooler on the Wodan

This cable coiling machine makes spooling cable/wire much safer and more efficient. Senior Project Engineer Michel van Hoof is a member of the design team: *"A spooler/reel stand is often a self-made piece of machinery. A serious accident recently took place involving this machine, in which the forces placed on the spool forced it out of the brackets, leaving it to roll across the deck as an unguided projectile. One of the operators suffered a serious arm injury as a result."*

Safe and practical

This accident was the motivation to design a safe spooler, Michel explains. *"With this spooler, the drive flange locks automatically when the reel is inserted. The machine is stable and lowers in case of overload so that it cannot be pulled apart. And the machine is practical: the adjustable width of the machine allows various reels to be used and thanks to the collapsible undercarriage (2 x 3 meters) and the separate drive, the spooler is simple to use and easy to stow on board. That means the machine is always available."*

Experiences in practice

A prototype of the design has now been produced, which has been placed on board the Wodan. The initial experiences have been positive; a number of minor points for improvement are being gathered. The expectation is that the spooler will become generally available at a later stage. The prototype is currently being modified in a number of ways. The next two prototypes of the spooler will be delivered in late July.

In the spotlight:

This time in the spotlight: The business unit Boskalis Offshore Subsea Contracting. What do the people in this business unit do? And what does safety mean to them?

Boskalis Offshore Subsea Contracting:

What?
Dredging work and stone dumping related to the oil and gas industry offshore, particularly pipelines and platforms.

Who?
Approximately 35 people work at the office in Papendrecht [Netherlands], focusing on obtaining and carrying out projects. A project team is formed from the pool for each accepted project. Currently, there are approximately 85 people (apart from the vessels' crews) working on the various projects.

How?
The BU works with vessels from the dredging fleet, with fall pipe vessels and the two new N-class vessels, Ndeavor and Ndurance.

Ndeavour next to the gas extraction platform

What does safety mean to Boskalis Offshore Subsea Contracting?

Business Unit Manager Bas van Bemmelen is proud of what his BU achieves and of the steps that are being taken in the area of safety. "We work here with tremendous forces, therefore the risks are proportional. But those forces do not, in and of themselves, make the work unsafe. Everything depends upon sound preparation, a clear distribution of tasks and effective communication. Being willing to talk about things is important. I see that this is becoming second nature to our people."

"Every two weeks, we have an offshore safety meeting with the BU managers, the commercial people, operations and a safety manager. During the meetings, we discuss what we are going to do during the projects and what risks there are. To wake everybody up, I sometimes ask: ***"At what point are we going to lose someone if we do not work correctly?"***

Because that is the harsh reality. For that reason, we go through the work step-by-step. If we come across a problem area, we report that to those responsible for the project. The fact that there are more eyes looking at issues means people are more alert."

Training young people

"What I see as the common denominator among all of the safety risks is work experience. We work with young people a great deal, some of whom have just finished school. To make an accurate assessment of the risks, you must have experience. It is important to continuously visualize what steps we are going to take in an operation and what that means in terms of safety: where are you going to stand, how do you approach the work, and what do you do if things are about to go wrong? To train young people in this area, we try to pair them with experienced personnel."

Learning from each other

Within offshore, we are going to collaborate more with other BUs. What we already do is share experiences and learn from each other in that way. The Malampaya project is an example of collaboration, a project which we are carrying out together with Marine Contracting. What we are going to deliver here is a true source of pride; true customized work, with customized tools. What is great is that this project brings together groups of people, such as purchasing and the TD, within the company. After all, we need each other in order to achieve this."

NINA is becoming second nature

What is crucial for safety is that everything be thought out in advance. With these types of complex projects, there is no longer any room for improvisation. And when everything is clear and the work begins, it is: communication, communication, communication. NINA helps with that. NINA encourages people to talk about safety. I see that this is becoming second nature among our people. I hope to inspire other people in this way."

customized work at sea

Project: Installation offshore depletion compression platform, Malampaya, Philippines

For client SHELL, Boskalis is installing an offshore depletion compression platform (DCP) next to a gas production platform in the waters of the Philippines. The goal of the DCP is to increase the pressure in the gas pipeline. It is the first task for the multifunctional ship Ndeavor.

For this project, upon request from SHELL, the Ndeavor was equipped with a Dynamic Positioning (DP2) system. The vessel was equipped with a drum cutter, but can also load and dump stones. In addition to the crew and the client's people, the staff is also sailing on the Ndeavor. In total, there are 49 people on board. This spring, the seabed was dug to a depth with sufficient support capacity for the platform; then, stones were dumped for the foundation. Late this year, four anchor handling tugs will arrive to the put the platform in place. Next, another bridge will be constructed between the existing gas production platform and the new platform. The project will be completed in mid-2015.

Light in millions of Filipino homes

Preparation for the project started in October 2012, and shifted into a higher gear in April 2013 after the project was awarded. And with good reason, because the risk profile is high. Specifically, the Ndeavor often works next to the existing gas platform that provides power to 30% of the country, including the capital Manilla. In other words: millions of households have access to electricity thanks to this gas production platform. That's why the safety and quality requirements are so high. Eric the Troije, Works Manager: *"We work in accordance with our own safety standards. For each risky activity, the staff and crew fill in a safe work method statement (SWMS, comparable with a JHA). In this document, we describe the risks and the control measures that we take. That SWMS can be prepared weeks in advance and will be discussed with the relevant team if and when it becomes relevant."*

NINA training for truck drivers in their own language

Traffic training

This approach colors the general work attitude on the vessel: thorough preparation and good communication. According to Hilde Schonewille, Superintendant Seabed Preparation, that is the key to success. *"Thanks to the short lines of communication, discussions can be held very easily on board; every morning, everyone who is on duty – the crew, staff, and client – takes part in the prestart meeting on the bridge. During that meeting, the schedule for that day is discussed, including the safety risks. Even more consultations are held throughout the rest of the day. And we evaluate important activities - in that way, we share lessons learned. An example of good preparation is the attention that is given to the transportation of the stones from the quarry to the storage location. "The traffic here is hazardous; a lot of accidents happen. To reduce the risk of incidents, we have provided the drivers with an intensive NINA training course in their own language. In preparation for this training, we photographed all of the risky areas along the route (schools, intersections, etc.). We discussed them during the training. This approach has borne fruit: currently 41,000 tons of the 68,000 tons have been transported to the storage location without incident. This part was also an area of concern for the client. We have been able to reassure them with our approach."*

BU manager Bas van Bemmelen on the Malampaya project:

"Because we have never set up a vessel in this way, we were forced to deal with teething problems. What I think is very good is that the team did not allow itself to be rushed, but works in a deliberate manner, holds meetings, and takes the time to repair things properly. The team looks at what can be done safely on board offshore and when they actually do need to go into port. That is a difficult decision, because the port is more than 350 kilometers away. But with NINA, the half-baked solution is truly a thing of the past. That is a major change. When I myself was in implementation, I was quite inclined to say 'time to bite the bullet, we're just going to get it done quickly.' Now, the conversation arises automatically and safety is paramount. And SHELL appreciates that. We have regularly received kudos from the company."

Day in, Day out

Steve van Hulle and Frans Oosterwijk compare notes on the safety policy. Steve comes from Smit Transport Belgium and works as Operations Manager at Boskalis Offshore Marine Services. Frans works as Fleet Manager in Papendrecht. This time they have invited two head engineers to tell their tales: Kees Davidse from the Taklift 6 and Kees van Dam from the Colbart backhoe.

Deck and engine room: two different worlds?

(From left to right) Frans Oosterwijk, Kees van Dam, Kees Davidse and Steve van Hulle

Frans says: *On some vessels there is a subdivision between deck and engine room; in that case it's every man for himself and there is little coordination. Does that sound familiar?*

Kees van Dam says: No, absolutely not. It plays a greater role on larger vessels, but we only work with a crew of eight. That means you need all hands on board; you need to rely on each other.

Kees Davidse adds: That's what things are like with us as well. On the sheerlegs you work together in a small team.

Kees van Dam:
"Thanks to NINA there is an atmosphere of trust and people can grow in their jobs."

Steve adds: *I think it also depends on the people and the culture. When I was still sailing, I regularly visited the control room; after all, you want to know what's going on. What do you think?*

Kees Davidse says: I agree with that. You can only work safely if you coordinate with each other and discuss things.

Kees van Dam adds: I think NINA means a lot in this regard. People talk a lot more about safety (and not only during the 'post-dredging' after work!). People respect everybody's input, regardless of their position. This creates trust and allows people to grow in their job: I have noticed that co-workers from the Philippines are now less hesitant to provide feedback and make practical suggestions. NINA contributes to the safety and the quality of our work.

PPE in the engine room?

Steve: *What do you think: is PPE just as important in the engine room as on deck?*

Kees Davidse says: I believe that different rules apply. A hard-hat is not very practical in the engine room, but you have to wear one if the situation requires it, for example, during lifting work. That's your own responsibility. The condition is that you have to work with experienced men. In case of young boys or hired workers, you must always be clear about how you want things to be, because they don't always see the risks.

Frans adds*: Incidents still occur on board, resulting in eye injuries. Now it's up to the vessels to decide if safety goggles are mandatory or not. Wouldn't it be better to have a single policy?*

Kees van Dam says: By making those goggles mandatory, you are creating a false sense of security. What's important is to keep thinking about what you're doing and confronting each other if required.

Frans adds: *PPE can save you when things go wrong. However, the emphasis should be on the measures taken to prevent things from going wrong. That's what the discussion should be about.*

Kees van Dam says: That's also the case increasingly often. We work a lot with the Bizon tugboat and include them in the communication on safety. A lot is gained from this exchange. It's no use to sit behind your PC and complain: throw it out there!

Kees Davidse:
"You can only work safely if you coordinate with each other and discuss things."

Steve: *And how important is it to serve as an example as a Head Engineer?*

Kees Davidse says: It's very important. In every regard: from wearing your PPE to how you deal with others and your working method: we no longer rush things. In my experience, NINA makes it easier to confront each other.

We look forward to hearing your ideas on how to improve safety. Please send them to: safety@boskalis.nl

Colophon

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