Straatman Mooring Systems

permanently installed bollard equipped with sensors to measure loads on mooring lines and communicate them in real-time to a dashboard and log of load, direction, angle, tide, weather and vessel history

the challenge

Until now it was impossible to measure mooring line loads of moored vessels continuously. The lack of measured data means that designs are based on maximum forces based on the mooring lines MBL or computer models. For the Port Authority and Terminal Operator it is important to know exactly what the loads on the mooring lines are, especially in case of bad weather or for ports dealing with strong currents, high winds, and frequent passing vessels.

Why is measuring load crucial?

There is a significant safety risk when the loads on the mooring lines are too high. It can cause line breakages and vessel drifting, endangering port staff and marine vessels. Imagine a stormy day with high waves, strong currents, and gusts. A disaster can strike if the load on the mooring lines becomes too much. Ropes snap, ships detach, and serious accidents will happen. And it's not only just about material damage, which can amount to millions of euros or dollars; there is also a significant risk to people on the dock if the ropes break.

In 2007, during a storm in the Port of Rotterdam, a ship was blown away from the dock. It drifted and hit a pier at the MOT terminal, causing 150 million in damages. A similar incident happened more recently in Antwerp. A ship was blown off the dock and crashed into a container crane on the other side, causing it to collapse. And these are just a few examples. These problems are likely to become more common with climate change. Additionally, ships are getting bigger, which increases these risks.

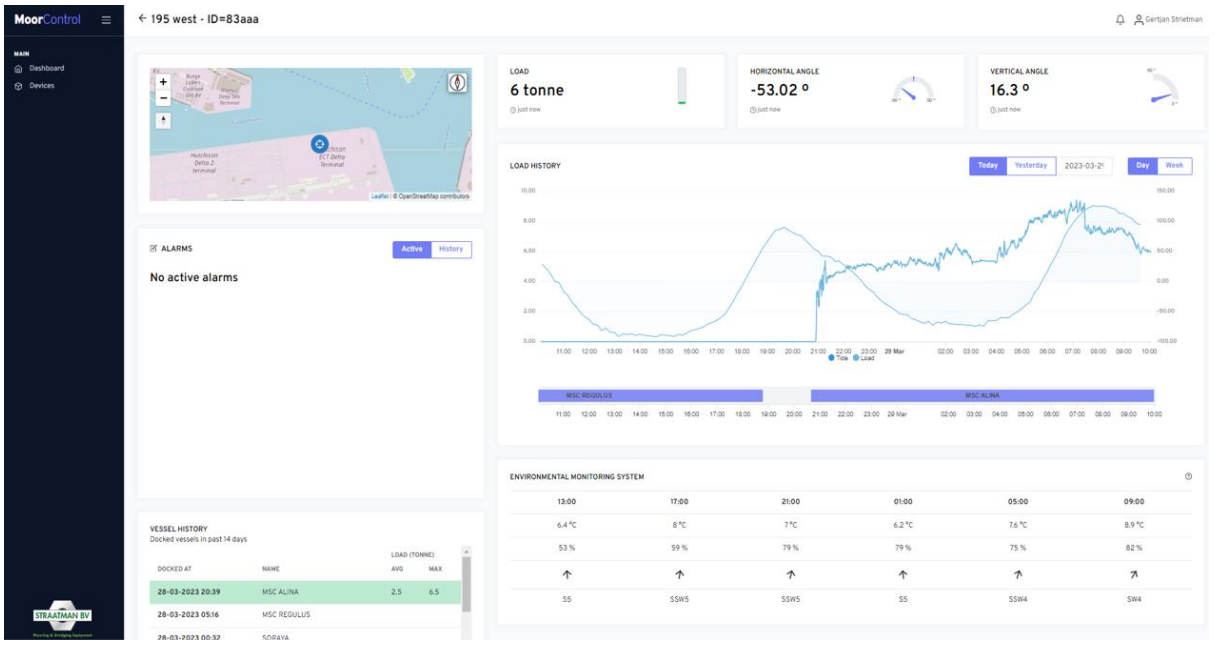
Continuously measuring loads on the mooring lines and the real-time monitoring will therefore increase safety as you know exactly what is happening

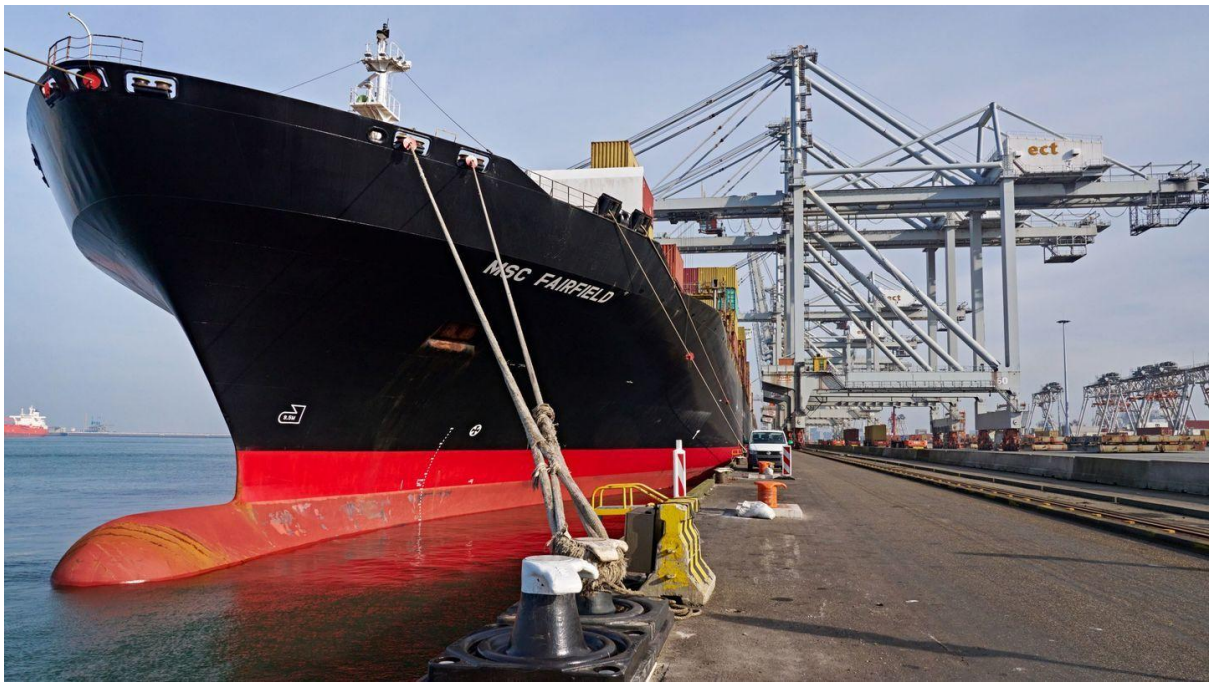
the innovation

In close cooperation with the Port of Rotterdam, we developed the Smart Bollard. The Smart Bollard is similar to a standard bollard and is permanently installed on quays; however, equipped with sensors, it measures the loads on the mooring lines. The measurements are communicated in real-time and the actual data is available for the port authority and the terminal operator. The systems dashboard displays and logs pivotal data for analysis like load on the line, line direction and angle, tide level, weather conditions, and vessel history. Administrators can conveniently add users, set alarms, and integrate the data into other systems through the provided API. The application can be used for all seagoing vessels, such as container and bulk carriers and cruise vessels.

The Smart Bollard increases safety for operators and assets by real-time monitoring of the vessel and therefore helps to prevent unsafe situations.

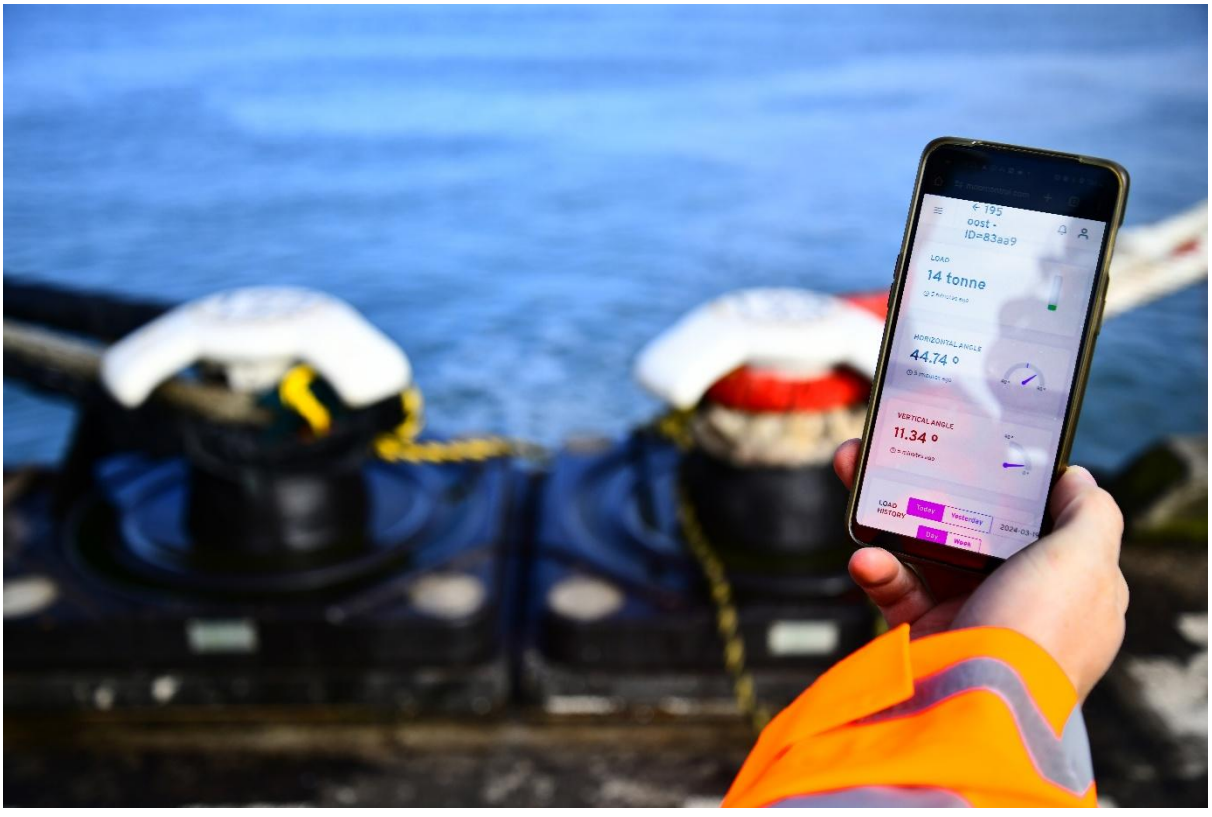
Besides, the Smart Bollard will increase efficiency by gaining a complete overview of the mooring forces in all conditions, which will result in more efficient use of the port. This will, for example, give the possibility to moor larger vessels on quays. Furthermore, it can reduce costs by making data-driven decisions, which can lead to a reduced need for expensive resources such as tugs.





how it was implemented

The Smart Bollard has been carefully developed and tested over several years. Our engineers put a lot of work to make sure it is reliable, accurate, and durable for the tough conditions in the maritime industry. Many prototypes were improved through repeated testing. Computer simulations were used to check its strength and performance under different loads.

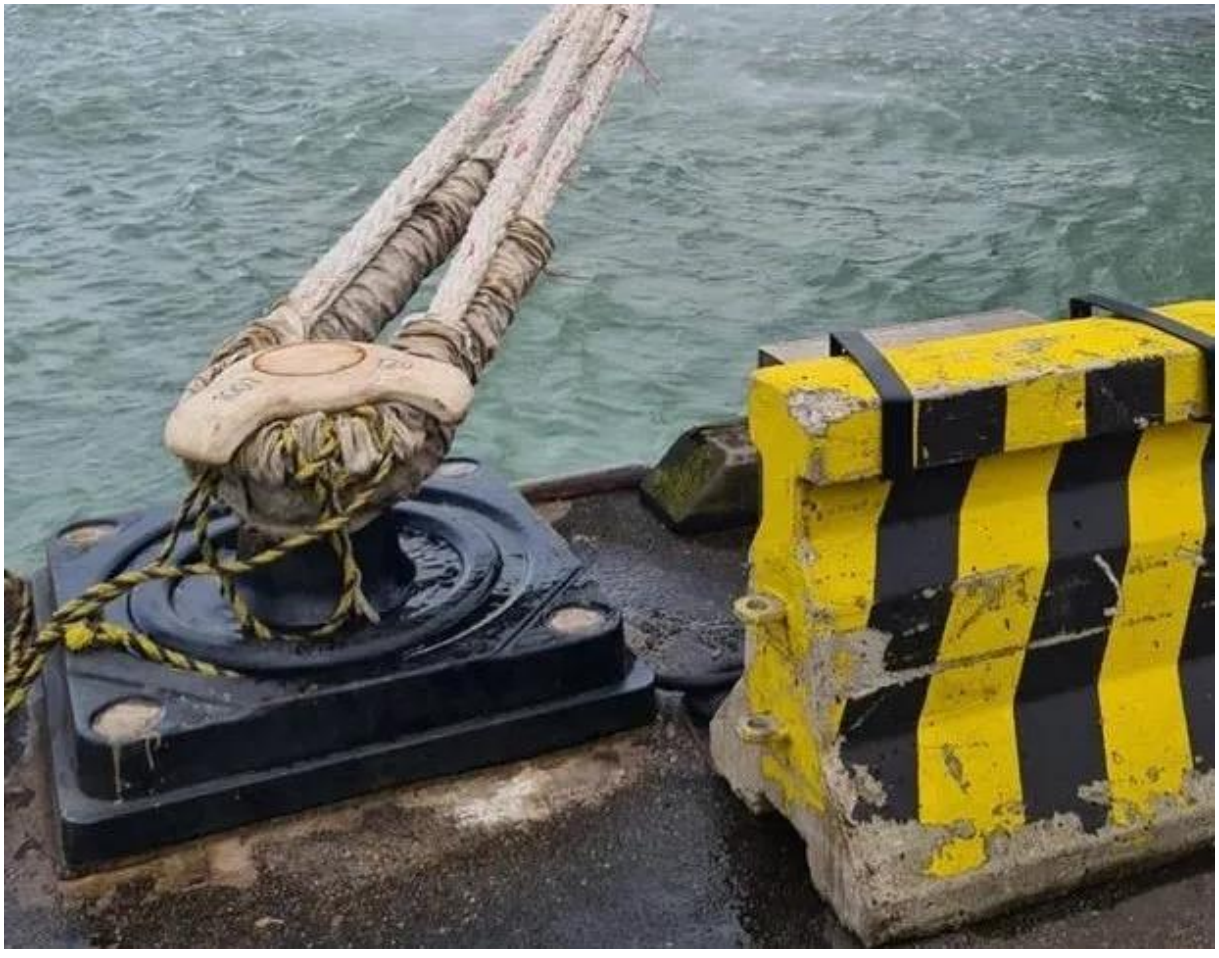


All this detailed work has created a strong and effective solution that meets the needs of the maritime industry.

The Smart Bollard has been tested many times in our test bench. After the successful tests in the test bench, the Smart Bollard was installed as a pilot at ECT Delta terminal at the port of Rotterdam in January 2021. This bollard position is used very regularly and therefore provides valuable measurement data. Various tests were carried out during the pilot. Several measurements have been taken by KRVE with a load cell between the bollard and line. In addition, measurements were taken with a test frame from BollardProof.

result

The successful trial of the Smart Bollard at the Port of Rotterdam, has demonstrated its efficacy in improving port efficiency through digitization. Nowadays, we installed 6 pcs of Smart Bollards at the ECT Delta terminal and 108 pcs along the new Prinses Amalia quay of the Port of Rotterdam. Besides the Port of Rotterdam, we have installed Smart Bollards at the Port of Valencia (MSC Terminal) and Port of Antwerp.



conclusion

The real-time monitoring and data collection from the Smart Bollards will lead to more efficient port operations, and help to prevent unsafe situations while vessels are moored.

We have created an animated video that explains the Smart Bollard:
https://www.youtube.com/watch?v=HUaGkqjp3RY

LINK: https://mfstraatman.com/en/smart-bollard

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