

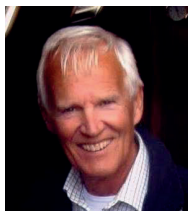


Monitoring a ro-ro platform to prevent damage due to overloading

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Summary

A concrete loading platform started to show cracks after introduction of double stacked container loading onto the vessel. After repair works to the concrete top layer, a monitoring system has been installed to track the loading magnitude and frequency. The monitoring system is capable of warning both the owner and the operator of the platform in case of overloading.

Keywords: strain gauges, surcharge load, monitoring, concrete piles, integrity, double stack, containers.

1. Introduction

The roll on – roll off platform of P&O Northsea Ferries in Rotterdam has been constructed in the sixties of the 20th century. At the end of the 20th century damage to the platform occurred after P&O started loading and unloading with double stacked containers on lorries with solid small diameter wheels.

After repair of the platform it was decided by the Port of Rotterdam Authority to monitor the platform in order to detect overloading. A monitoring system has been designed by Gemeentewerken Rotterdam.

After installation, the system has been calibrated with lorries with known weight. The system is now in operation. When overloading occurs a picture is taken to record the lorry and containers causing the overloading. This picture is then sent to the owner of the platform, the Port of Rotterdam Authority. The recorded data provides information how frequently the capacity of the platform is exceeded. The monitoring system installed on this platform is a pilot for other constructions managed by Port of Rotterdam Authority.

The paper will discuss the choices made during the design process of the monitoring system, how the system was installed and calibrated and example results from the system in operation.

A histogram of the typical loading frequencies (*Figure 1*) during a regular week can be derived from the measurement data.

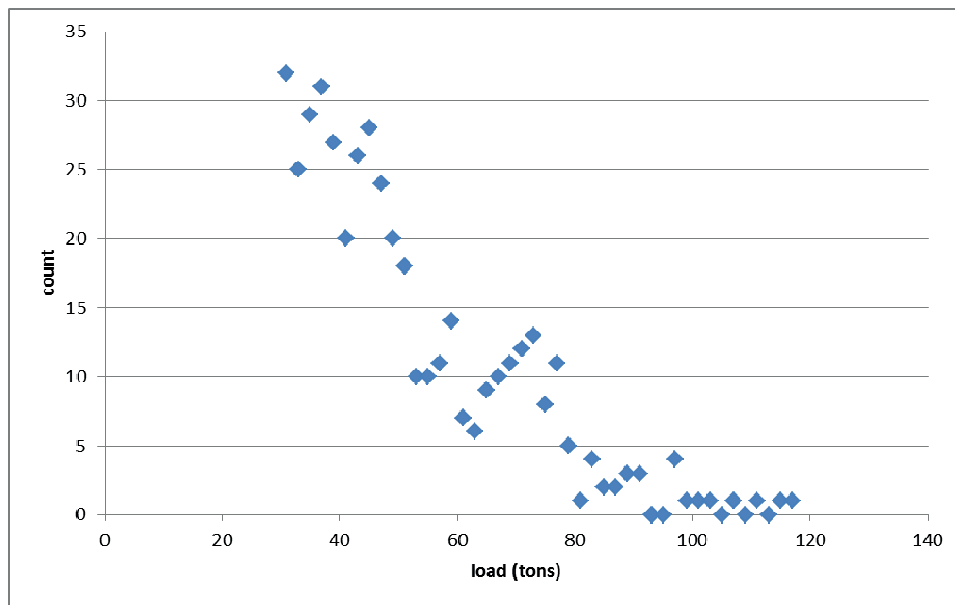


Figure 1: Number of loading events per load category

For each passage surpassing the alarm level, a picture is send to the operator and Port of Rotterdam Authority.

2. Conclusions

- A load monitoring system on a platform founded on piles can be based on measurements on the piles only if the system is calibrated on site.
- Traditional galvanic strain gauges can perform remarkably well, even in salty areas if the sensors are installed carefully and extensive effort is put in sealing the gauges and cables with epoxy.
- When a known load situation occurs frequently (no trucks on the platform in this case), these moments can be used to automatically calibrate the strain gauges. By doing so, the reliability of the measurements can be greatly increased.
- The system has provided Port of Rotterdam Authority with valuable information on load-strain of concrete platforms under highly concentrated loads.
- The information can be used to verify the design of the platform and to optimize future designs.

3. Acknowledgement

We like to thank Peekel Instruments for their cooperation during design and installation of the monitoring system.