## Examples of the implementation of "smart quay walls" from Ballast Nedam's project Princess Amalia Harbour quays

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Baltic and Black Sea Ports & Shipping 2023 Exhibition and Conference 17<sup>th</sup> of May 2023





- Examples of the implementation of "smart quay walls" from Ballast Nedam's project
  Princess Amalia Harbour quays
- Brief presentation of Ballast Nedam

PORTS

#### Construction of Princess Amalia Harbour quays

Future-proof through intelligent quay walls, preparing Rotterdam for the largest container ships in the world.

#### Rotterdam | Ballast Nedam Infra Projects, Ballast Nedam FES

Commissioned by the Port of Rotterdam, and together with our trusted partners HOCHTIEF and Van Oord, Ballast Nedam is building the extension of the Princess Amalia Harbour quays. This project involves 2.4 kilometres of intelligent quay wall expansion.

Every day, approximately 356 sea and inland vessels sail through the port of Rotterdam. This number is increasing – partly due to e-commerce. Also, the size of the containerships is increasing. By constructing new deep-sea and inland navigation quays in the Princess Amalia Harbour, the various container terminals will have the space they need to develop further.



PORTS

#### Construction of Princess Amalia Harbour quays



## An innovative quay wall

Not only the scale of the quay wall makes this project special. The Princess Amalia Harbour project also distinguishes itself from other projects in terms of technology. The quay wall is going to be 'smart' and is equipped with all kinds of sensors that monitor forces and deformations. This enables technicians to monitor movements of the quay wall when ships dock for example. Our client Port of Rotterdam can use this information for follow-up projects and for the maintenance of the quays. Moreover, thanks to smart sensors, fewer physical inspections are needed. **1,825 m** Length

360 m

Earth retaining walls





#### Smart quay walls & trends in quay-wall engineering Alfred Roubos: Port of Rotterdam Authority & TU Delft

### 3) Sensoring & digitization



8 maart 2023









### Digitalisation

The digitalisation of the construction industry offers plenty of opportunities. Not only for ourselves, but also for our clients.

Through innovation and digitisation, we can involve all stakeholders in our construction process and increase quality and production.

This creates a cooperation between people, machines and systems.

### A24 Blankenburgver binding

Four kilometres of civil engineering constructions



#### Rotterdam | Ballast Nedam Infra Projects & FES, DEME

The entire project is built virtually, including all temporary works. This full 4D model ensures that the planning and costs are prepared in detail and that risks are addressed in advance. We guarantee the quality and progress of the project with drones, laser scanning and sensoring. Once the project has been completed, we are able to transfer all available data to the asset managers and operators.

Project from design to maintenance

#### DIGITALIZATION

#### Bricklaying robot ready for its first working days on site

In times of a housing shortage, labour shortages and the decrease of skilled workers, this innovation comes in handy.



#### **Rotterdam | Ballast Nedam Infra Projects**

The robot, with a trained operator, does as much work as three bricklayers. The innovative way of laying the brickwork saves costs and increases the speed of construction. Moreover, it is a sustainable solution that reduces mortar consumption by 30 to 50 percent and substantially cuts CO2 and NO2 emissions. It also prevents those scarce bricklayers from being physically overburdened. DIGITALIZATION

# Drones and robot plotters

Cooperation between humans and machines opens up new possibilities

#### **Rotterdam | Ballast Nedam Infra Projects**

We drilled 280,000 protruding reinforcements and brackets into the underwater concrete floor of the Maas Delta Tunnel and the Holland Tunnel. This job was done by a robot plotter. We also make systematically take measurements with drones, allowing large data collection used to generate 3D-models. It's safer, easier and more sustainable.

### 2

Certified drone pilots in-house

#### 280,000

Boreholes by robot plotter at A24

#### Looking forward together

- Ecosystem is becoming more mature
- Standardisation is happening quickly
- Way of working promotes new possibilities for close collaboration
- Lifecycle cost-savings of implementing smart solutions in new investments
- Opportunity to explore new challenges together!

## Who we are

#### **History overview Ballast Nedam**



#### Founding the company by merger







1877 Ballast's first head office



1936 Moerdijk bridge, The Netherlands

#### **Historical landmark projects**









Afsluitdijk

The Netherlands

**Peace Palace** The Hague **Van Nelle Factory** Rotterdam

#### Schiphol Airport

The Netherlands



Velsertunnel

The Netherlands



**Oosterscheldedam** The Netherlands



**King Fahd Causeway** Bahrain/Saudi Arabia



**Storebaelt Bridge** Denmark

#### We Challenge to Improve

## Company DNA

- Dutch construction and development company with international orientation
- People and relationships are our main interest
- Solution driven and client oriented
- Talented and experienced staff
- More than 140 years of experience
- International, national and local projects

- Full range: complex, high rise, challenging projects and smaller sized projects
- International strong brand
- Track record of successful projects
- Sustainable, safe and responsible
- Financially healthy



#### **Overview Organisational units**





International presence (offices and/or projects)

Africa

Tanzania

Guinea-Conakry

**Carribean** St Martin Curaçao Europe The Netherlands The United Kingdom Belgium Luxembourg Germany Switzerland Sweden Turkey

> **Asia** Sri Lanka

#### **Overview Ballast Nedam locations**



#### What we do Expertise



#### **Safety indicators**



## **Financial information**





# Ballast Nedam Challenge to Improve