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Oranjewoud: A world of opportunity!

Comfortable living, work, travel and recreation are only possible with a proper understanding of space. Oranjewoud's fields of activity consequently range from urban development, mobility, construction and property to rural development, water, the environment, safety, sport and recreation.

We operate in the Netherlands and on an international scale too. Oranjewoud was a major force in land management under Frisian management some 60 years ago. Our organisation has developed into an all-

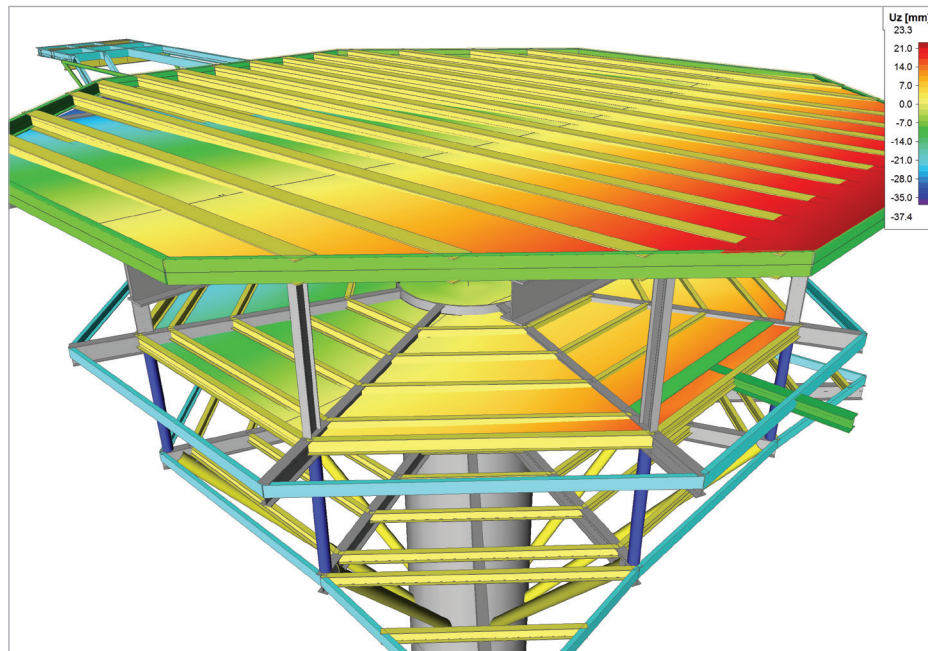
round partner and is much more than just an engineering consultancy.

Mission

Oranjewoud aims to be a leading partner in the development and application of sustainable and integral solutions relating to all aspects of our living environment, such as home, work, recreation, mobility and the environment.

Core values

Enterprising, People-oriented, Development, and Character.



Software: Scia Engineer

Oostdijckbank Radar Post Helicopter Platform - Nieuwpoort, Belgium

Introduction

The SRK (Scheldt Radar Chain) manager plans to discontinue the use of the helicopter type currently used to transport maintenance staff to and from the Oostdijckbank Radar Post. It would like to make the radar post accessible for Belgian naval helicopters. The new helicopter type (NH-90) is considerably heavier, which results in significantly higher static and dynamic loads on the steel platform structure of the helicopter tower. On behalf of SRK, Soresma NV asked Oranjewoud to perform a structural analysis of the existing helicopter tower and to draw up specifications for the necessary structural alterations.

Description of the radar post

The Oostdijckbank Radar Post consists of a radar tower and a helicopter tower connected by a footbridge. The radar tower houses technical systems while the helicopter tower is made up of a helicopter platform with a workshop underneath. Fuel and water tanks are accommodated within the actual tower.

The main structure/foundation of the helicopter tower consists of a single tubular pile with a diameter of 3.0 m. The foundation depth of the tubular pile is -25.000 m MLLWS. The top of the tubular pile is at +17.500 m MLLWS. The elevation of the helicopter platform itself is + 21.000 m MLLWS. There are two more platforms at + 17.500 m MLLWS and + 15.000 MLLWS, respectively. The helicopter platform and the lower platforms are made up of a girder structure, topped with steel plate in case of the helicopter platform and workshop, and with a steel grating in case of the lower platform. The girder structure of the helicopter platform and the middle platform are supported by columns on the bottom platform, which in turn is supported by shoring on the tubular pile.

Main characteristics:

- Monopile dimensions: \varnothing 3.000 x 30 mm, L = 42.5 m, S355J2G3 grade steel
- Helicopter platform deck: sheet steel thickness 20 mm, orthogonal grid of HEA280 on HEA500 beams
- S235JO grade steel
- Platforms at + 17.500 m and + 15.000 m MLLWS in a design with tangentially positioned IPE200 beams

- between 8 radially positioned IPE360 beams of S235JO grade steel
- Total weight of helicopter tower (steel): 212 metric tons.

Use of Scia Engineer

According to the existing calculations the capacity reserve of the helicopter platform is limited. For this reason, it was decided to model the entire steel structure in Scia Engineer, 3D FEM software. The monopile and the beams were modeled with beam elements and the cover plates of the platforms at + 21.000 m and + 17.500 m were modeled with plate elements. The staircases connecting the three platforms and the hoisting beam for the rescue boat are also included in the model. The connecting bridge between the radar tower and the helicopter tower, the grating elements and the wall elements were not modeled in Scia Engineer. The effects of the distribution of horizontal load of the wall elements are handled by adding shoring between the columns.

A total of four computational models were created. These computational models all have the same structure, with the exception of the horizontal spring constants that support the monopile and the load combinations that were calculated.

The following computational models were created:

1. Extreme situation according to BS6349
2. Normal-1 situation according to BS6349
3. Normal-2 situation according to BS6349
4. Combinations according to EN-1990

Models 1 to 3 are used to check the strength and stability of the monopile according to BS6349. For these models, the wave and current loads (according to the Shore Protection Manual) and the wind loads (according to EN-1990) were applied. Model 4 is used to calculate and check the steel structure of the platforms according to NEN6770 and NEN6771. With model 4 the normative helicopter landing conditions according to the Heliport Manual (ICAO) are calculated. The 3D-FEM modeling, in Scia Engineer, of the helicopter tower ensured that the load distribution was optimized, while the necessary structural alterations were kept to a minimum.

Oostdijckbank Radar Post Helicopter Platform

Nieuwpoort, Belgium

Project information

Owner Schelde Radar Keten
General Contractor lemants NV
Engineering Office Ingenieursbureau Oranjewoud BV (original design Haecon & lemants)
Construction Period From 2000 to 2002
Location Nieuwpoort, Belgium



Short project description

The project is about alterations to the helicopter platform of the Oostdijckbank Radar Post in the Western Scheldt estuary. The radar post consists of a radar tower plus a helicopter tower. As in the future considerably heavier helicopters will be used, Oranjewoud was asked to perform a recalculation of the existing helicopter tower construction to determine if it would be possible to use the NH90 helicopter without extensive alterations to the tower. The results of the recalculation indicated that only a few components would be inadequate and Oranjewoud was asked to work out and draw up the specifications for the required alterations.

