CAREER EPISODE 1

Wind farming in Europe, and Oil and Gas Platforms Structure Execution in The Middle East

A) Introduction

[CE 1.1]

Project: Wind farming in Europe, and Oil and Gas Platforms Structure Execution in the Middle East

Duration: [Date] – [Date]

Location: [Location]

Organization: Petrofac Int. Ltd.

Position: Graduate Engineer (Structural Engineer)

B) Background

[CE 1.2]Nature of Overall Engineering Project

Petrofac Int. Ltd. awarded me a permanent job as part of their university job fair at my university in 2013. The company's plan that year was to take graduates under the wing of their new initiative program called Petrofac Academy. The academy was systemized in a way to teach graduates the ins and outs of the oil and gas industry to prepare and guide us in the path of professional engineers. The program constituted of workshops on time management, communication, and team working, all of which were accompanied by E-learnings. After four months of soft skills and training, we were given placed in positions on projects to discover the real professional job nature.

[CE 1.3]Objectives of Project

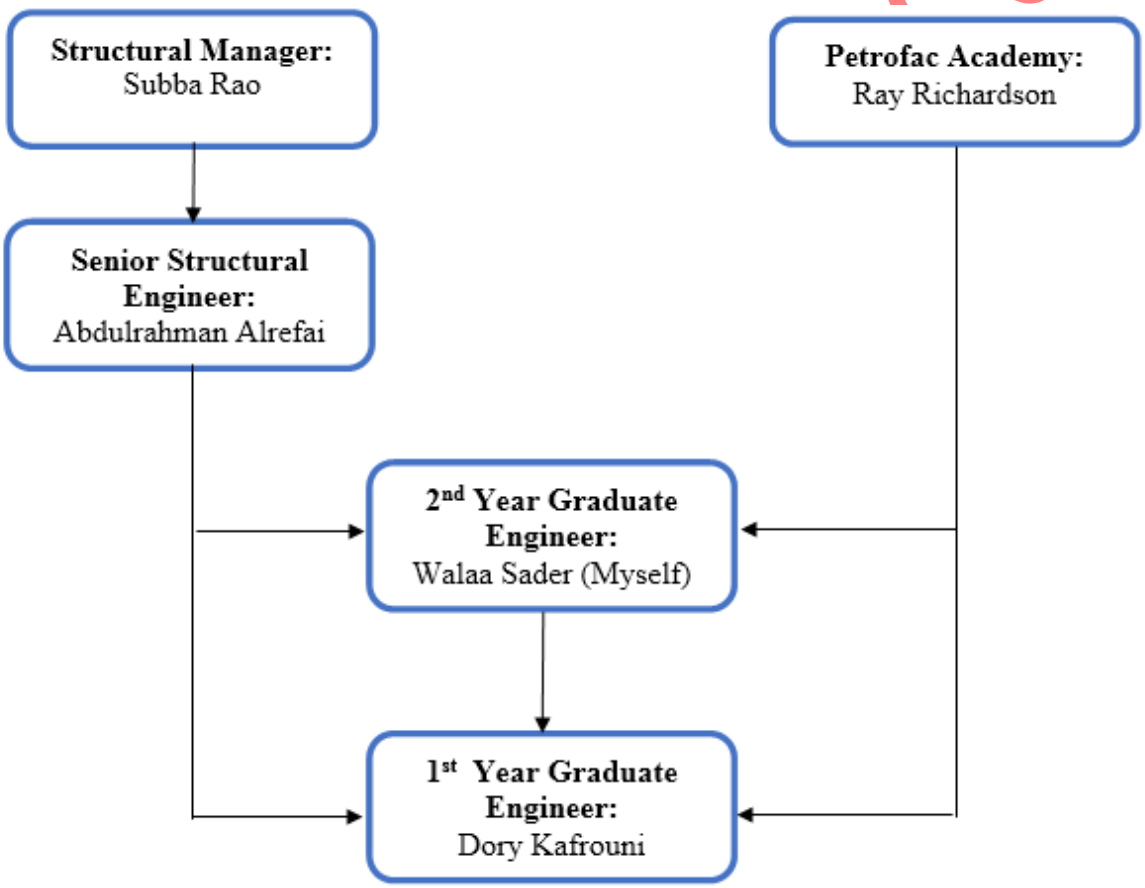
At the beginning of 2014, I joined a small and relatively new department in Petrofac which served offshore capital projects. This was the beginning of my technical engineering employment. I was not placed on one specific project, rather I was rotated between several projects being supervised by my direct manager. His intention was for me to learn the most in the shortest time possible. My involvement was on ongoing projects and proposals in offshore projects which were

particularly related to wind farming in Europe.

[CE 1.4]Nature of Particular Work Area

These projects included offshore platforms for wind farming in Europe, and oil and gas platforms in The Middle East. Both of which are structurally similar in engineering, but different in components and designs.

[CE 1.5]For the first two years in Petrofac, I was under the wing of Petrofac academy. This means that career development plans were discussed with the organizational development of the academy in support of my direct supervisor on the project. This allowed alignment between my aspiration, the project's requirement, and the company's needs.



[CE 1.6]Through the beginning of my career, I have learned the fundamentals to push start my career as the structural engineer for offshore platforms. From there with guidance and more training, I became responsible for conducting the below activities:

- I reviewed the structural drawings.
- I prepared material take off from drawings along with the bill of material quantification.
- I prepared weight control reports.
- I carried out drawings modification utilizing AutoCAD.

- I carried out activities particularly dependent on the offshore specific software which included modeling the structures.
- I analyzed the various performed activities included in the design and it included reading the analysis reports.
- I performed changes or optimization based on the analysis outcome.
- I mentioned a younger engineer in all the responsibilities performed by myself.

C) Personal Engineering Activity

[CE 1.7]Technical Details of Work

As a full-time permanent employee in Petrofac, I was mentored by my direct manager (Subba Rao), and a senior engineer (Abdul Rahman). Both helped me through learning which about offshore structures like topsides and jackets which are two items that form a completed standalone offshore platform. The offshore field is a completely new area for a person like me who majored in civil engineering. One of the first things I have learned was that all offshore structures are fabricated (constructed) on land, and then transported offshore for installation. This methodology is safer, cost-conscious, and time-efficient. I have been trained to understand how the environmental loads imposed by the seastates and wind affect platforms and the types of analyses required to be implemented on such structures to have a stable structure pinned in the harsh conditions of the seas.

[CE 1.8] How you applied your Engineering Knowledge and Skills

I considered wind loads which were secondary with regards to the overall loading of the marine structure. This included consideration made of the acceptable state as long as the wind force's magnitude and moments were a fraction of the complete loading. For such situations, there were cyclonic storms and operations based on the wind loading magnitude consideration. It was critical and was accounted for in the design. There were wind coefficients utilized in offshore structures load analysis which were taken from the provided data and all the mandatory measurements were executed accordingly. There was engineering research made that usually focused on the global motion analysis prediction and was not in the wind load itself. Also, the wave, wind, and current combined motion analysis effects, and were analyzed from numerical models mainly validated from the model testing.

[CE 1.9] Tasks Delegated and How accomplishing them

Aside from analyses that are conducted on the platforms in their final positions in the sea, other analyses are essential for the logisticsof the structures during and after the construction onshore. Each analysis has an impact on the structure in a different way and based on the results shown in the report, the design has to be either strengthened or optimized. The structural department's main aim on offshore projects was to have a safe design and optimized in weight. I applied the deterministic analysis which was done for proving to be a reliable approach for dynamically insensitive structures. These included situations where all fatigue waves were of sufficiently higher wave[3]

periods for avoiding peaks and structural valleys transfer function. I conducted fatigue analysis that did not utilize wave spectra and performed relatively few discrete wave analyses for determining stress range values. There was an appropriate wave heights number with corresponding periods which were selected for defining the relationship among stress range and wave height. I obtained the stress range for each wave and the number of occurrences that were utilized for determining the fatigue damage.

[CE 1.10]Strategies Devised by You

I researched the stress concentration which occurred because of geometric alteration of the load path with the local welding profile effects. Depending on various independent researches, there were few parametric sets established with varied capabilities and accuracy degrees in the analysis of various joint geometries. These were utilized for stress concentration factors calculation. In the research, the factors related to stress concentration in the tabular joint were calculation by utilizing different equations.

[CE 1.11] (i) Problem: The problem was faced regarding the fatigue analysis which was a challenging part of the work.
Solution: The fatigue analysis was performed utilizing the two techniques and it included fracture mechanism and S-N approach mechanism. I carried out the S-N approach which was dependent on the experimentally obtained S-N curve presented in the specified design code.
(ii) Problem: The scenario was faced regarding the execution of another approach which was based on the Paris law particularly derived in fracture mechanism.
Solution:I evaluated and applied the S-N curve which was widely utilized and was the most appropriate one. The technique was used for the determination of the acceptable flaw size along with assessing fatigue crack growth, repair strategy, and planning inspection, etc.

[CE 1.12]How you worked with other team members
I discussed various technical elements with the Senior Structural Engineer and it resulted in getting the specified work results with consistent execution of structural engineering practices in the project. The definite project milestones were achieved by obtaining the set results.

D) Summary

[CE 1.13]

The weight of the platforms which were executed played a huge role in future activities, as it impacted the cost, methods, and means of transportation and installation. Usually, these activities impacted the project cost by a huge margin. I evaluated the stress concentration factor which was defined as the hot spot stress to nominal stress ratio. There was a stress concentration factor mainly sensitive towards the fatigue estimation of the tabular joint.

[CE 1.14]

Although the type of engineering involved in offshore was quite advanced and not entirely related to my studies in university. The working environment in Petrofac was very harmonized, and colleagues were willing to put time and effort in teaching a graduate like myself, because they needed fresh and young blood, to support new and unconventional ideas.

[CE 1.15]

All the assigned work activities were achieved by implementing the technical duties which played a fundamental role in the structural engineering domain. All the set milestones related to the project were achieved using consistent technical skills in the structural engineering field.

CAREER EPISODE *2*

Borwin Gamma Project

A) Introduction

[CE 2.1]

Project: Borwin Gamma Project

Duration: 2017 – 2020

Location: United Arab Emirates (UAE)

Organization:Petrofac Int. Ltd.

Position: Structural Engineer

B) Background

[CE 2.2] Nature of Overall Engineering Project

Petrofac Int. Ltd. awarded me a permanent job as part of their university job fair at my university in 2013. The company's plan that year was to take graduates under the wing of their new initiative program called Petrofac Academy. The academy was systemized in a way to teach graduates the ins and outs of the oil and gas industry to prepare and guide us in the path of professional engineers. SIEMENS and Petrofac as a Consortium were contracted by DC Netz BorWin3 GmbH to design, build and install a 900 MW Offshore HVDC converter platform. The converter platform will be installed in the EEZ (Exclusive Economic Zone), North Sea.

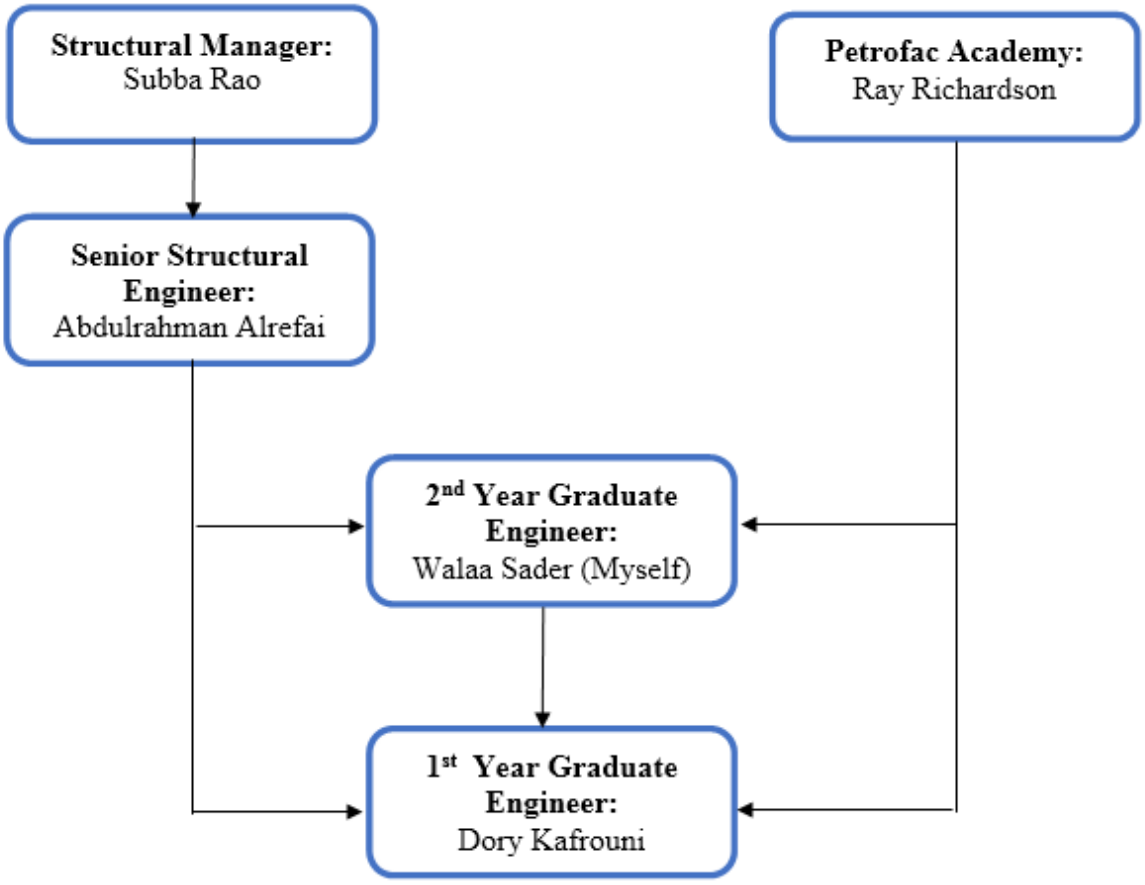
[CE 2.3]Objectives of Project

This project aim was the execution of the loadout, transportation, and installation of the BorWin Gamma platform, in all its phases. The project was started from the offshore worksite preparation, foundations installation, standalone testing, topside installation, standalone phase II testing, and hookup & commissioning of the secondary system, etc.

[CE 2.4]Nature of Particular Work Area

The work area was related to the implementation of structural engineering activities which was linked with defining the set project objectives and achieving the results within the specified timeline.

[CE 2.5] Hierarchy:



[CE 2.6] Responsibilities:

- I executed the foundation installation of the jacket of the defined platform from the heavy lift crane vessel.

- I did Jacket configuration which worked on defining the six main legs particularly split into two rows.
- I carried out the 'Stand Alone Phase' execution where the foundations were not accessed from the set construction point.
- I did transportation and installation phase execution which was initiated when the resources and equipment for the offshore campaigns were mobilized.

C) Personal Engineering Activity

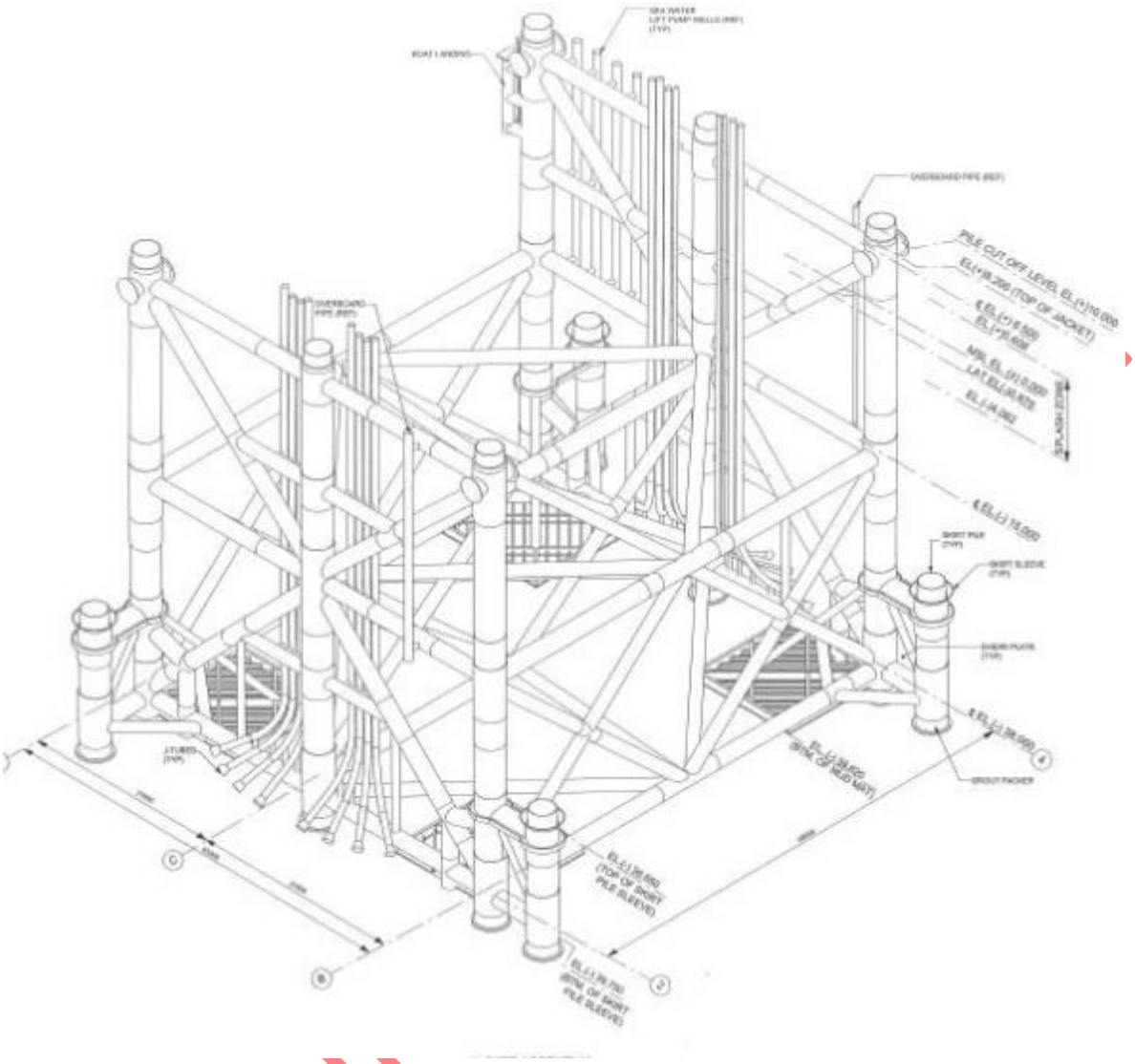
[CE 2.7] Technical Details of Work

Before the actual start of the Offshore Construction activities, the Offshore Worksite was prepared by CONTRACTOR. A vessel worked in pre-laying an array of Cardinal Buoys. Subsequently, a dedicated vessel for the Noise Mitigation during Foundation Installation enteredthe field and deploy the so-called "Bubble Curtain" on the seabed. In this phase, I carried out the installation of the Foundation (Jacket) of the platform by a Heavy Lift Crane Vessel. I made sure to lift the jacket from a Cargo Barge and set it down on the seabed. Then, work was done on the piles mainly driven in the seabed in order to fix the foundation. After completion of the activities, the Heavy Lift Crane Vessel and the Cargo Barge was associated with the Towing Tug left the area. The Borwin 3D model is shown below:

I carried out the designing of the BorWin-3 Jacket which worked as a steel tubular structure suitable for the installation of the Topside by means of a float-over operation. I set the Jacket configuration which presented six main legs, divided into two rows. The Jacket foundations were constituted by ten piles, divided into six main piles installed through the legs, and four skirt piles installed through the skirt pile sleeves.

[CE 2.8] How you applied your Engineering Knowledge and Skills

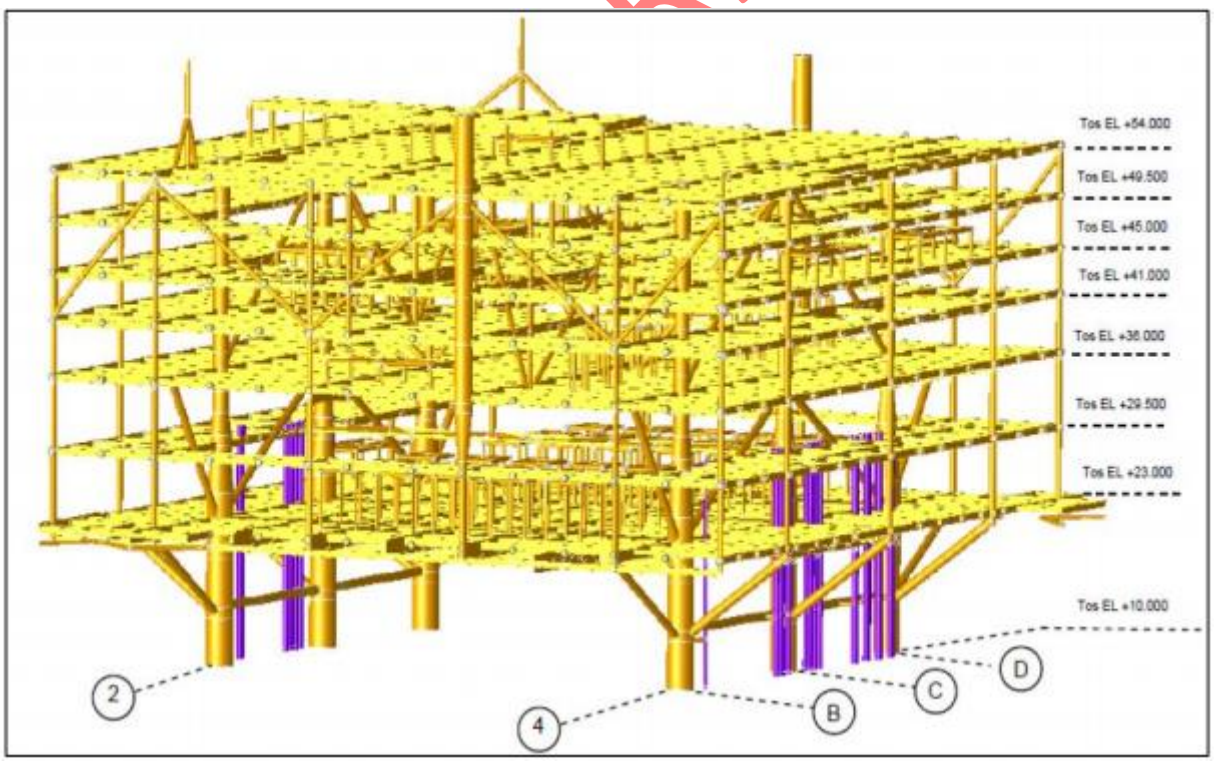
The isometric view of the Borwin-3 Jacket is shown below:



I obtained the table which showed the NTE weight with further limiting the COG locations of BorWin-3 Jacket during different design stages. These were Load-out, Transportation, Float-over, and Operation.

Case Description	Weight			NTE Weight	COG Coordinates		
	Basic (MT)	Cont. %	Factored (MT)	(MT)	X(m)	Y(m)	Z(m)
Loadout – (Jacket + Temporary)	6387	7%	6854	7500	0.50	0.01	-19.85
Transportation – (Jacket + Temporary)	6597	7%	6155	7500	0.48	0.01	-20.54
Lift – (Jacket + Temporary)	5746	7%	6155	7000	0.55	0.01	-19.19
Operating – (Jacket Operating Condition)	10442	7%	11197	12500	0.32	-0.47	-31.26

The design topside view is below:



After the Foundation Installation and before the Topside Installation, I worked on the 'Stand Alone Phase' where the Foundations were not be accessed for any construction activity. The Topside installation was performed with a float over methodology. A Heavy Transport Vessel

transported the Topside from the Fabrication Yard to the Offshore Worksite, and then the vessel positioned itself above the Foundations and through a vertical movement accordingly lowered the Topside on the Foundations. After the Topside was installed on top of the foundations, there was another 'Stan Alone Phase', before the platform was accessed to perform Hook-Up and Commissioning activities.

[CE 2.9] Tasks Delegated and How accomplishing them

I executed the engineering phase with other team members in which the installation methods and corresponding planning were developed. This included the allocation of the equipment and arranging subcontracted services if required. I worked on the deliverables particularly agreed upon in the Master Document Register and necessary for the proper execution of the project. I altered the set-up of the project team as required to meet changing project requirements. I prepared the deliverables as per contract requirements. I monitored the progress against the engineering schedule and reported. I met the relevant quality requirements by working in accordance with the Management System using the systems as established. I executed the transportation and installation phase in which the execution phase was started when the equipment and resources for the offshore campaigns of the project were mobilized. I executed this phase successfully which ensured by working in accordance with the installation manuals, prepared during the previous phase, the Management System, and contract requirements. I monitored the progress against the construction schedule and reported to Company.

[CE 2.10] Strategies Devised by You

Upon completion of the set work activities, I made sure that the resources and equipment were demobilized. I prepared an internal and external closeout report, as-installed documentation was issued to Company and a close-out meeting with Company was arranged. I executed the interface management which was in accordance with the BorWin-3 project mainly characterized by its complexity and its diversity involving stakeholders and players from all over the world. It was important to ensure that all interfaces were properly managed, maintained, and registered. For that, Petrofac and its subcontractors followed the main elements which included early identification of interfaces, focusing on interfaces for the entire project, clearly defining and communicating roles and responsibilities regarding interface management documented in a responsibility matrix. I prepared a Single point of contact (SPOC) for interface management. I conducted a thorough review of work scopes to prevent any undesired effects resulting from uncontrolled interfaces and all parties to comply with the milestones set for processing and resolution of interfaces. I set the work timetables which were agreed and achievable. I also integrated the key interface activities into the Project Execution Schedule.

[CE 2.11] (i) Problem: The challenging part was jacket transportation and installation which was required to execute smoothly.

Solution: As part of the construction of the BorWin-3 Offshore Converter Platform, Petrofac and its subcontractor HMC was required to perform the transportation and installation of the jacket and piles. The jacket installation also served as preparation for the float-over installation of the topside.

(ii) Problem: Another challenging step was carrying out the fabrication of the foundation yard.

Solution: The BorWin-3 Jacket was fabricated at the Heerema Fabrication Group yard in its Vlissingen site. The Vlissingen facility is situated on an industrial estate in the Harbor Vlissingen, in the South West of the Netherlands. It is easily accessible by road and inland waterway. I recommended the place where the yard has unrestricted access to the sea. The 200,000 m2 construction site has a 720-meter quayside, of which 450 meters are available for load-outs up to 20,000 tons.

[CE 2.12]How you worked with other team members

The discussions were made in the project regarding the specified project results and it included addressing the technical elements and getting the set results. All the defined milestones were achieved within the specified tenure and with consistent execution of the structural engineering activities.

D) Summary

[CE 2.13]

During this phase, all the secondary systems were operational and the remaining works were performed only on the HVDC Equipment.

[CE 2.14]

While executing the work activities, I also noted that the non-performing interfaces were proactively elevated to ensure timely resolution. These were subjected to the number of interfaces and size of a scope that was required to conduct regular interface meetings attended by the relevant representatives of the interfacing parties. These attendees were required to have decisive authority within their organization.

[CE 2.15]

The research was conducted in the project regarding the set work elements and technical duties were addressed accordingly which played a vital role in the implementation of objectives. Significant enhancements were made in the structural engineering domain for obtaining the targeted results.

CAREER EPISODE 3

HOLLANDSE KUST (ZUID) ALPHA PLATFORM

A) Introduction

[CE 3.1]

Project: HOLLANDSE KUST (ZUID) ALPHA PLATFORM

Duration: [Date] – [Date]

Location: [Location]

Organization: [Organization]

Position: Project Engineer

B) Background

[CE 3.2]Nature of Overall Engineering Project

The HKZ Alpha OSS platform consists of a six-legged jacket substructure supported on six skirt piles, with an integrated cable deck and a topside that consists of 4 decks. The cable deck being a part of the jacket facilitates the cable pulling before the topside installation.

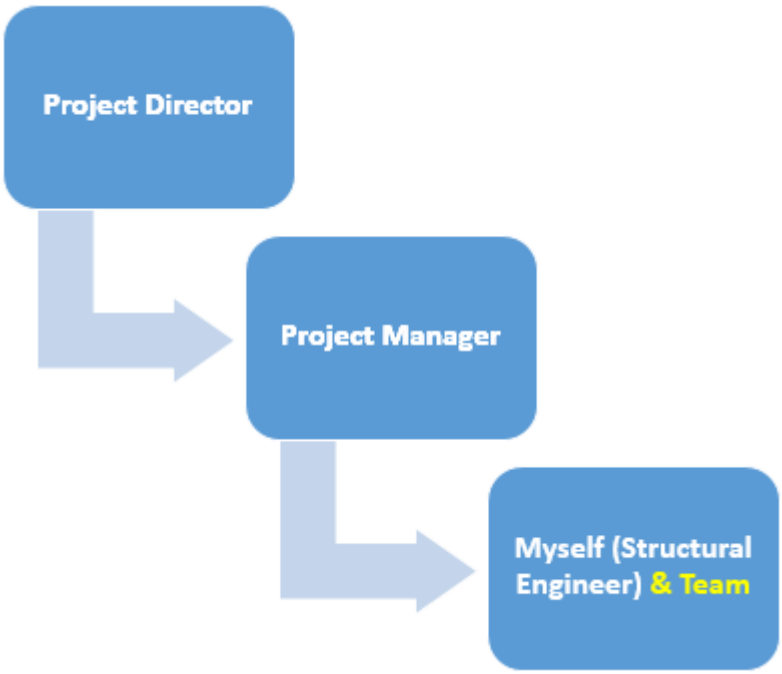
[CE 3.3]Objectives of Project

The scope of the project was to define the design requirements and implementing the procedures and parameters required for the structural analysis and design of the HKZ OSS platform topside and substructure for a life span of 30 years. The design included ULS, FLS, ALS, SLS, and installation conditions such as lift, transport, on-bottom stability, and load-out. In the project, I used ACS 11.2 V8i for the global design of Jacket and Topside. The selected software resulted in the execution of the modeling the structure as a 3D space frame, generation of member loads due to waves, current, self-weight, and buoyancy, solution of non-linear pile-soil interaction, solution for forces, displacements, and reactions via stiffness analysis.

[CE 3.4] Nature of Particular Work Area

The work was done for carrying out the post-processing of results to perform buckling stability, hydrostatic collapse checks for structural members, and punching shear checks of tubular joints. The defined objectives were achieved by applying fundamental practices related to the structural engineering domain.

[CE 3.5]



[CE 3.6] Duties:

- I exported cable which was located on the Northside of the platform at the defined cable deck level.
- I analyzed the Serviceability Limit State (SLS) which was in correspondence to tolerance criteria.
- I obtained variable functional deck loads determination which was in accordance with the DNVGL-OS-C101 [/S2/].
- I analyzed the critical wave direction which was linked with the obtained maximum forces.

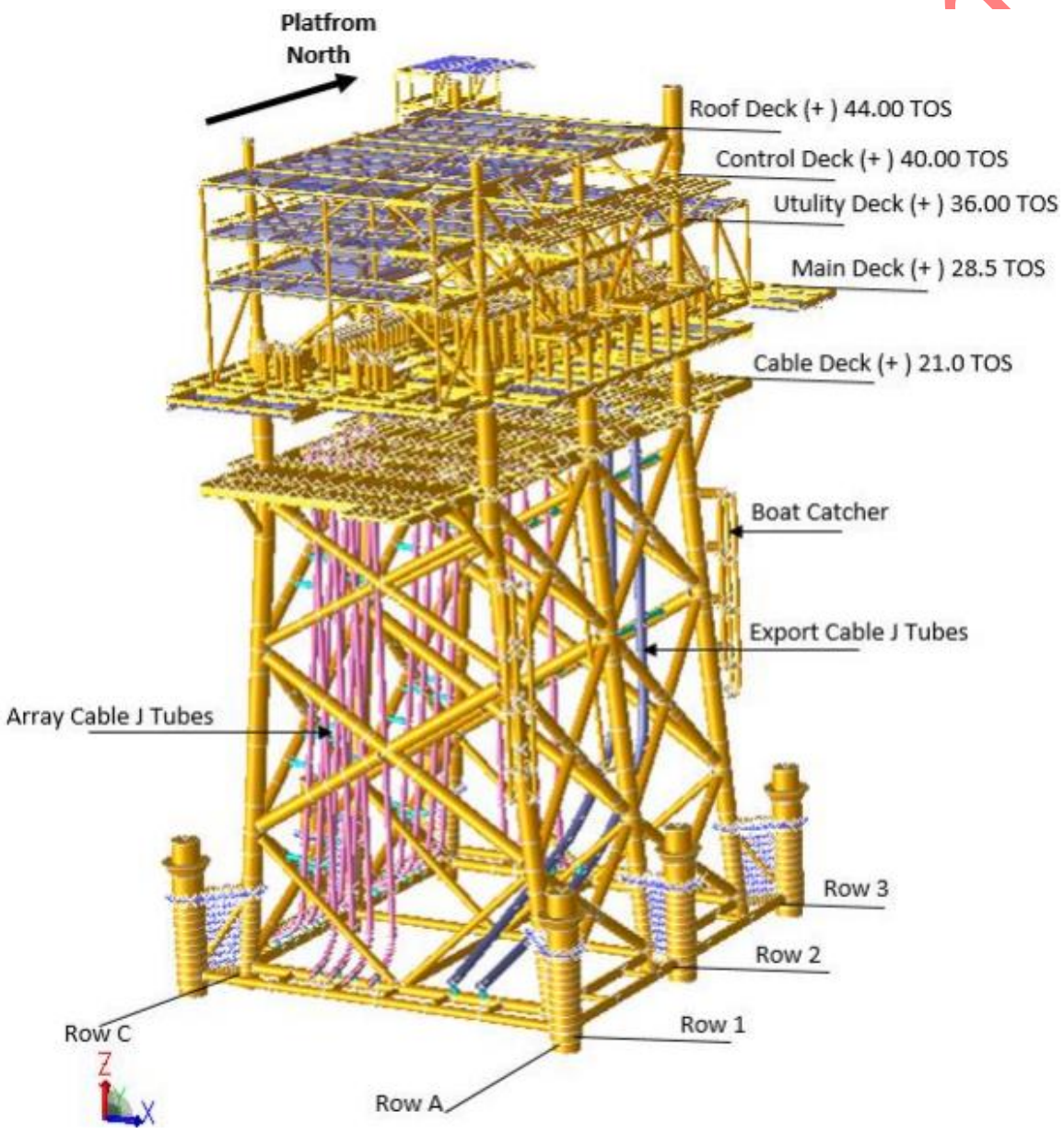
C) Personal Engineering Activity

[CE 3.7] Technical Details of Work

The jacket legs were having a single battery in the East-West direction. I obtained the horizontal framings which were provided at cable deck level EL (+) 21.0 and Mud-mat level EL (-) 21.40. I connected the skirt sleeves which were connected to the jacket at an elevation EL (-) 14.93m. The Jacket was fitted with 17 no. array cable J tubes and 2 no. export cable J Tubes. I obtained the export cable which was located on the Northside of the platform at cable deck level and exit the platform on the Southside near to mud level, thus diagonally crossing the jacket. I obtained the two boat catchers which were provided on the East face of the jacket. The topside structure consisted of 4 decks at various levels as given below.

Main Deck	EL (+) 28.5
Utility Deck	EL (+) 36.0
Control Deck	EL (+) 40.0
Roof Deck	EL (+) 44.0

The 3D view of the HKZ Alpha OSS platform is shown below:

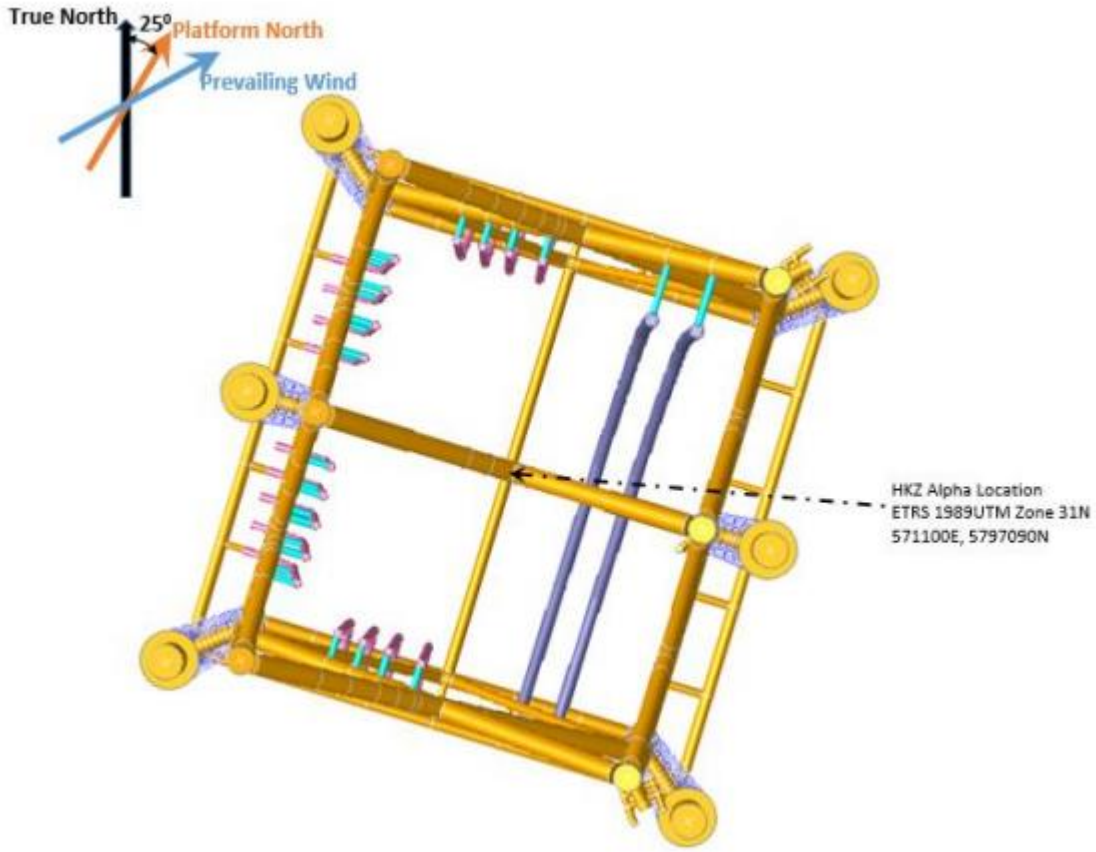


[CE 3.8] How you applied your Engineering Knowledge and Skills

I carried out the project planning in which an important aspect was the installation in the Dutch part of the North Sea. I obtained the exact location which was presented in the table below:

Latitude	Longitude	Easting	Northing
52° 19'10.3" N	4° 2'35.3" E	571100m UTM31N	5797090m UTM31N

The mean water depth at this location was 23.0m with respect to LAT. The field layout of HKZ Alpha OSS was presented in the figure below:



I designed the platform structure which was for the service life of 30 years. The design fatigue life was presented with the limit state approach which was adopted beyond which the structure/structural components will no longer satisfy the design requirements. I considered the design of the platform which included the ultimate Limit State (ULS) corresponding to the maximum load-carrying resistance. I evaluated the Fatigue Limit State (FLS) which was corresponding to the failure due to the effect of cyclic loading. There was an Accidental Limit state (ALS) corresponding to the maximum load-carrying resistance for accidental loads and post-accident integrity of the damaged structure. Also, I obtained the Serviceability Limit State (SLS) corresponding to tolerance criteria applicable to the intended use or durability.

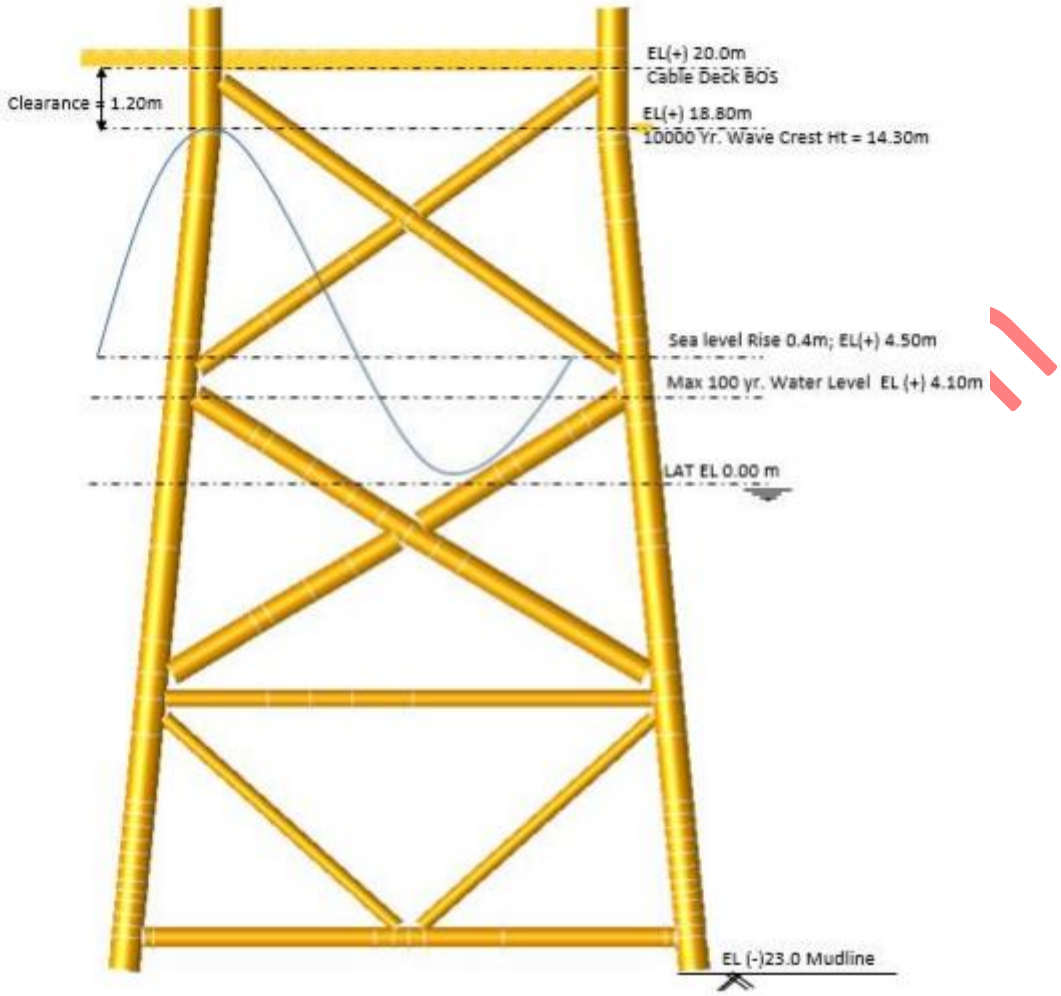
[CE 3.9] Tasks Delegated and How accomplishing them

I calculated the air-gap which was based on the 10,000-year wave crest position and the maximum 100-year water level. The values of the environmental data used below are according16

to metocean data ref [/C2/].

	Based on 10000 yr.	***DNVGL***
10 000-year design wave crest (maximum water level w.r.t LAT)	14.30m*	-
100-year design wave crest (w.r.t LAT)		10.08m*
Maximum water level (wrt LAT)	4.10m	4.10m
Sea level rise	0.40m	0.40m
Installation tolerance		0.50m
Required airgap=20% of 50-year sign. wave height H_S = 7.10m x 0.20	0.00m	1.42m
Total =	**18.80m**	**16.50m**
Cable Deck BOS provided	**20.00m**	

I set the requirements of DNVGL-ST-0145 [/S1/] for the air-gap calculations in which the air gap was set at least 1m for the 100-year design wave crest. I obtained the minimum air-gap which was 20% of the 50-year significant wave height. In order to ensure that the cable deck does not come in the wave zone, the 10000-year wave crest was also calculated, and the cable deck BOS was fixed in such a way that it cleared the 10000-year wave. I obtained the figure below mainly representing the maximum water levels and clearance for a 10000-year wave.



[CE 3.10]Strategies Devised by You

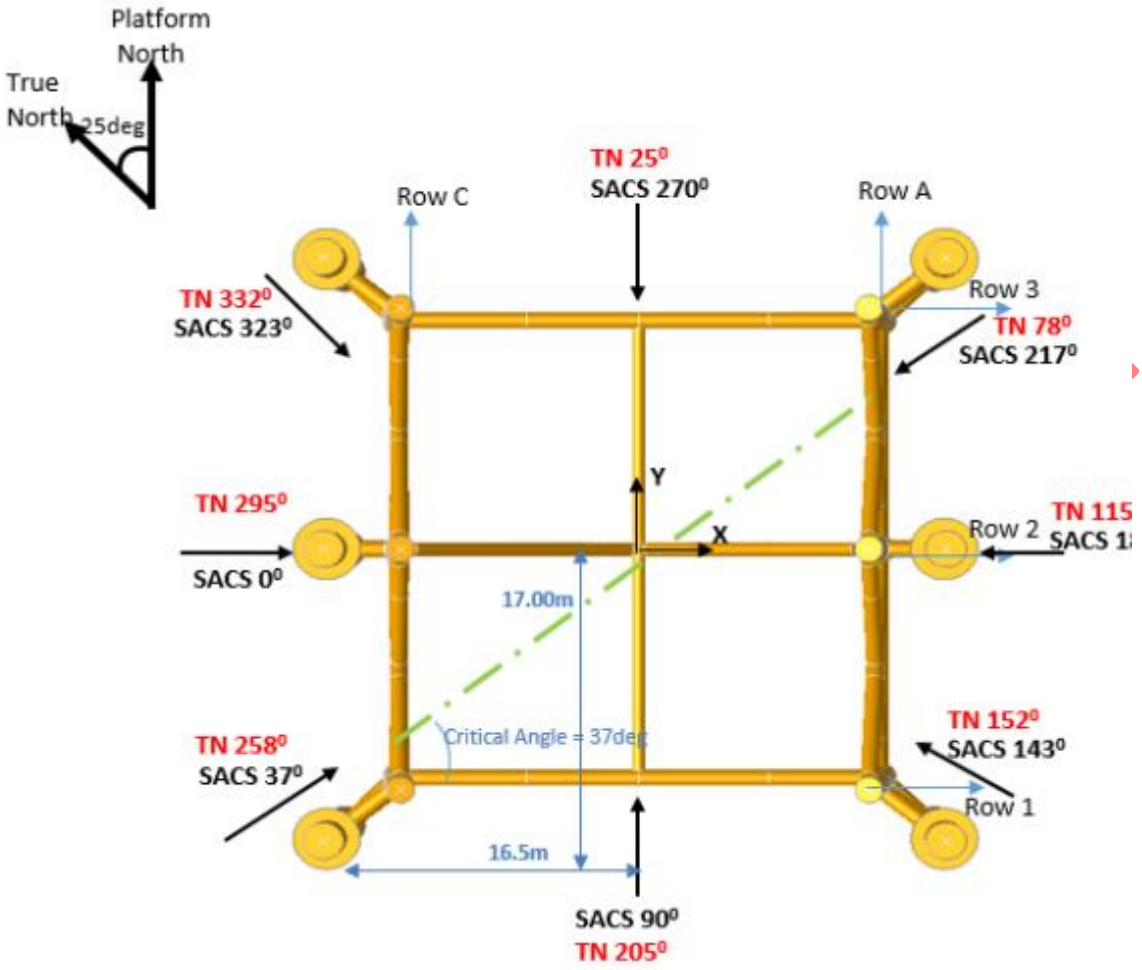
I determined the variable functional deck loads which were in accordance with DNVGL-OS-C101 [/S2/] and is presented in the table below:

	Local Design		Primary Design	Global Design (1)
	Distributed Load, p (kN/m²)	Point Load, p (kN)	Apply Factor to distributed load, p	Apply Factor to distributed load, p
Storage Areas	13	1.5*13	1.0	1.0
Lay Down Areas	15	1.5*15	f	f
Life Boat Platforms / Muster Area	9.00	9.00	1.0	may be ignored
Area between Equipment	5.00	5.00	f	may be ignored
Walkways, Staircases and platforms,crew spaces	4.50	4.50	f	may be ignored
Walkways, Staircases for Inpection only	3.00	3.00	f	may be ignored
Areas not exposed to other functional loads	2.50	2.50	1.0	-

I obtained the HKZ Alpha value which was provided with a platform crane. There was platform crane operating loads considered for 8 direction of the boom in combination with all other deck equipment and variable loads for topside design. I set the crane loading which was as per the crane vendor document. I combined the crane operating loads with the environmental loads and no man was riding specified for the platform crane. I considered the crane as at rest for the other environmental conditions and as part of the boom, weight was applied on the boom rest. I calculated the preliminary load data for crane pedestal design as shown in the table below:

Max. Axial Force (kN)	Max. Slewing Torque (kN-m)	Max. Bending Moment (kN-m)
1388	989	6536

I evaluated the above-mentioned loads which included a coefficient of 1.3 as per DNVGL-ST-0378 ref[/S30/]. I obtained the predicted number of cycles which were estimated to be 12000 for a total lifetime of 30 years. For the design of the substructure, no crane operating loads were considered. I analyzed the critical wave direction which provided the maximum forces and it also presented the angles to be considered in SACS and corresponding angle with respect to True North.



I carried out critical wave direction calculation as shown in the table below:

Pile No.	Pile Type	Pile Dia. Meters	X-distance (dx) Meters	Y-distance (dy) Meters	$D^2 * dx^2$	$D^2 * dy^2$	dy/dx	Approach Angle (degrees)
1	Skirt	2.133	-16.5	-17	1238.7	1314.9	1.030	55.52
2	Skirt	2.133	-16.5	0	1238.7	0.0	0.000	0.00
3	Skirt	2.133	-16.5	17	1238.7	1314.9	1.030	55.52
4	Skirt	2.133	16.5	-17	1238.7	1314.9	1.030	55.52
5	Skirt	2.133	16.5	0	1238.7	0.0	0.000	0.00
6	Skirt	2.133	16.5	17	1238.7	1314.9	1.030	55.52

[CE 3.11] (i) Problem: The challenging aspect was setting the installation tolerances when working on the air-gap calculation.

Solution: I included the installation tolerances and global water level rise in the air-gap calculation based on 100- year wave. I set the design water level with a return period of 100-20

years. I set the design wave crest height which was the crest height with a return period of 100-years.

(ii) Problem: The challenge was faced regarding the impact of energy which was to be considered during the execution of the project.

Solution:I considered the impact energy which was equivalent to various objects on the jacket members and these were performed with the possibility of the dropped objects scenario on the jacket braces.

[CE 3.12]How you worked with other team members

There were various practices executed as technical members in the project and numerous discussions with the project manager were made with getting the set results. All the defined elements were achieved with the implementation of the technical activities using structural engineering skills.

D) Summary

[CE 3.13]

I followed the requirements for the design of the HKZ platform against fire & explosion scenario was based on a fire and explosion safety study. The risk of fire and explosion including the design overpressure were to be determined within the research.

[CE 3.14]

In the project, I also worked on the helicopter winching operations for emergency cases only. There were no other operations than medical emergency which involved helicopter winching operations in the vicinity of the HKZ platform.

[CE 3.15]

Significant enhancements in my structural engineering skills were made with the targeted work objectives mainly achieved within the set tenure.

PROFESSIONAL ENGINEER

Summary Statement

These are the competency Units and Elements. These elements must be addressed in the Summary Statement (see Section C). If you are applying for assessment as a Professional Engineer, you will need to download this page, complete it and lodge it with your application.

Competency Element	A brief summary of how you have applied the element	Paragraph number in the career episode(s) where the element is addressed

PE1 KNOWLEDGE AND SKILL BASE		
PE1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	The three projects in the structural engineering domain were: • Wind farming in Europe, and Oil and Gas Platforms Structure Execution in the Middle East. • Borwin Gamma Project. • HOLLANDSE KUST (ZUID) ALPHA PLATFORM.	CE 1.1, CE 2.1, CE 3.1
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics and computer and information sciences which underpin the engineering discipline	The structural engineering activities were implemented in the project which ultimately brought the positive work results.	CE 1.9, CE 2.10, CE 3.8
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	I obtained technical understanding regarding the defined structural engineering practices which led towards gaining the positive results.	CE 1.10, CE 2.9, CE 3.10
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	Each element in the project was properly researched and defined directions were obtained for achieving the set results.	CE 1.8, CE 2.8, CE 3.9
PE1.5 Knowledge of contextual factors impacting the engineering discipline	The research on the contextual factors were made for achieving the specified results.	CE 1.11, CE 2.10, CE 3.11
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline	There was appropriate research conducted in the project which was relied on getting the specified results.	CE 1.9, CE 2.11, CE 3.8
PE2 ENGINEERING APPLICATION ABILITY		
PE2.1 Application of established engineering methods to complex engineering problem solving	I sorted complex engineering issues with implementation of the technical skills associated with the project.	CE 1.11, CE 2.11, CE 3.10
PE2.2 Fluent application of engineering techniques, tools and resources	I evaluated the associated project tools and resources which were mandatory to use in the work.	CE 1.9, CE 2.10, CE 3.8
PE2.3 Application of systematic engineering synthesis and design processes	I carried out systematic conduct which was mandatory in obtaining the set results.	CE 1.9, CE 2.11, CE 3.9
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	I sorted the work activities with implementation of the structural engineering conduct for achieving the specified results.	CE 1.11, CE 2.12, CE 3.12
PE3 PROFESSIONAL AND PERSONAL ATTRIBUTES		
PE3.1 Ethical conduct and professional accountability	There was an ethical conduct in the project maintained for achieving the specified work results.	CE 1.10, CE 2.9, CE 3.8

PE3.2 Effective oral and written communication in professional and lay domains	Specified communication path was followed in the work for achieving the set results.	CE 1.11, CE 2.10, CE 3.11
PE3.3 Creative innovative and proactive demeanour	I implemented innovative practices in the work which resulted to get the set work results.	CE 1.12, CE 2.11, CE 3.12
PE3.4 Professional use and management of information	I executed the usage of professional management skills in the work which brought defined work results.	CE 1.8, CE 2.8, CE 3.9
PE3.5 Orderly management of self, and professional conduct	There was professional conduct accordingly maintained in the project for gaining the set results.	CE 1.12, CE 2.12, CE 3.12
PE3.6 Effective team membership and team leadership	An effective team membership skills were applied in the project for gaining the timely work results.	CE 1.13, CE 2.13, CE 3.13