Bijlage 3:

Interview François Vranken (1st Officer/DPO o/b Neptune)

Are there limitations when using the crane because of the legs?

This will depend on the location specifications. For example, in this case it will not be possible to turn the crane towards the legs but let's say if you are jacked up higher than the crane can pass over the legs. Most of the job is the positioning of the vessel. We have to position the vessel so that we have the best angle for the crane. We also have to take into account the limitations of the crane. The crane is 600t but this is limited to 23 meter radius so it depends on the load that we have to take, how far we can be from the structure. So for example when we have a high load then we have to be as close as possible. Because the further we are from the structure the more capacity we lose. So we want to be close to the structure to use the full capability of the crane. Our crane is on the portside so it is best to position the crane so that the structure is on the portside. Doing so we minimize the distance from the crane to the structure and so we can use the full capacity. Within the 23 metres of radius we have full 600 ton capacity. But most of the time it is not really an issue because the biggest nozzle we took were 240 t or something like that. Only when removing very heavy structure the issue rises.

On the specifications document of the Neptune is mentioned that the payload is 1600 mt. What is meant by this and does it include the weight that the crane is transporting during the operation?

Actually the payload depends, it is contractual. We can have like an temporary increase, because the jacking system is stronger than the 1600 mt. But off course this depends on the condition. This has to be assessed by the manufacturer and the classification society and they may raise the payload with 300 mt for example. But you have to see how we calculate this in total elevated weight. So total elevated weight of the vessel is supposed to be 6000 t and can be increased to 6300 t and actually the system is able to go way more. And the lightship weight is 4400 so the payload is indeed somewhere about 1600 mt. But that is not the displacement of the vessel because when we speak of total elevated weight, what you need to understand is that you don't take into account the legs. Because you are climbing on the legs. So the weight of the legs is not counted in the elevated weight. Because they are not part of the ship anymore. They are on the ground, we climb on them and so it's the weight of the

platform that is taking into account. So when we are in the water and let's say we have reached the 6000 t, the complete ship and cargo, but on top of that we have to add 1600 and something ton of legs. So when we are in the water, the displacement is bigger.

What is the between legs with the pin and hole system and legs with rack and pinion system?

What you have to see is that is it all about cost, maintenance cost and speed and strength. So if you have a rack and pinion system, so this is an electric system and you are going up and down on this lattice structure. The most defence of that system is that these systems are faster, they are also cheaper to build so you gain time on the operation but assumed they have more wear and tears because of those small pinion that are going on the rack. there is a lot of wear and tear and then we have to exchange them from time to time. And this is also costing a lot of money. But you gain operational time, so it's a matter of decision with a new build, what do you want exactly, if you want to save on the new build, if you want a vessel that is faster in operation. But it is also a more fragile system, because the lattice structure is less strong than a full steel cylinder like we have here. So sometimes you bend a bot your legs or stuff like that. And if you have a lattice structure then you have to have spudcans on the bottom of the legs. These are kind of shoes and it is used to spread the pressure. Also, if you have a rack and pinion system, you need to do the preload with ballast water, because you cannot push too much. With a hydraulic system you can push as much as you like on the legs. With the limit of the pump pressure off course. So you can reach your preload pressure only with your hydraulic system, if you use a rack and pinion system you need to add weight to the vessel to make your preload. So okay it is going faster, you take the ballast water to make your preload, but if you fuck of your preload, you will have to go back into the water and refill your ballast and do it again. Also on this vessel the jacking system, it's a hydraulic system, we don't have footings. We can push with maximum preload capacity only by hydraulic. So actually it is really safe. We have no spudcans and jetting system on this ship. We can inject water, with high flow and a bit of pressure, under the legs to release them. Because it is all about, where are you going to use your jack up. So the soil condition is really important. For example, here we don't have the spudcan, we have a jetting system, we have a good and powerful hydraulic system. So also it is less prawn to failure, because the system is so strong. We can go in places where the other vessel cannot go. For example, at some place we have 30-32 metres of penetration in the ground. If you put a lattice tower into 32 metres of mud, good luck with taking it out. It will take days. Sometimes a vessel with rack and pinion system they get stuck

somewhere. And then they are busy for 6-7 days to retrieve the legs. For example, in the UK, it is a really bad soil condition because of all the gravel, and the sandbanks. And under that it is full clay. So there it is safer and more practical to use full hydraulic system because then you can go deep in the ground and it will not be an issue to retrieve the leg. This is because of the jetting system.

How do you maintain the legs?

Yes, so that is sometimes an issue. It is not really an issue for the system, it is just making it slower, because for example let's say you are working somewhere where there is a lot of clay in the soil. Then the clay will enter the leg and you will notice this when the legs are free from the ground. The pressure on the system will be a bit higher than usual, then you know that there is extra weight in the legs, that's mud. The mud is there so you will have to clean it. Cleaning it is not a pleasant job, you take a shovel and firehoses and you start cleaning it. Sometimes it will take some days. Sometimes it is also possible to lower the leg during the transit and then go not too fast, to put not too much stress on the structure. And we try to wash the clay out by the movement of the vessel. The legs are constructed out of high quality steel, it is normal that is rusts a bit. It also has a thickness of 3 cm so this is not really a problem. And every time you lower or hoist the legs they are cleaned by the friction. It is not an issue so that is why we don't paint. But this is the Neptune, we have empty spudcan, but if you look for example to the Thor, he has fully enclosed legs. So actually the holes where the pins are coming in are all protected by a structure to be sure that the mud doesn't get inside. This is an advantage and a convenience. With us for example, the leg is full of mud but because it is completely empty so if you push the pin will always go in. On the Thor, because the holes are fully enclosed, what can happen, and it happens sometimes, is that the mud is so stiff that the pin cannot go in the whole because it is full of the mud. And also, when they have to do a leg inspection, then it is becoming a problem because it is all void space on void space. So the procedure to inspect the legs is a big drama. It requires a lot of logistics because you have to open all those void spaces which are normally never opened.

Why are the tops painted in a different colour?

Actually here it is to show the limit, you cannot go higher. The legs here on the Neptune are 80.4 metres long and the maximum length of the leg under the hull is 62.7 metres. But if they agree we can provide. The last hole on the white zone has a steel piece that is there to make sure that the safety pin cannot engage with this hole. So it cannot go higher than that. This is a safety precaution. It will stop because off course the limit switch will be activated and it will not be possible to go any higher. The jacking up of the leg is stopped when the pin isn't able to go into the hole. This is because it cannot release the walking ring when the holding ring isn't able to engage with the leg. The company can also make the decision to extend the length of the legs by some metres. This is up to the company and up to the job that you have to do. If there is a contract that requires this ship to go to deeper places and the money of the contract is worth it then it is possible that the company will make the investment to longer the legs. The last plan that they had was to add, from under, another 8.4 metres pieces with a kind of footing. This was for a special kind of contract that later was cancelled. In these case to plan was to extend from the top but it can also be extended from the top. That all differs on the project, on the money and every time there is a different engineering solution. That is one of the strength of DEME, they developing their own pieces of technology and they have their own big engineering department. There are many solutions to reach the same outcome. For example when they were planning to add some length from the bottom, there were 2 plans, one was to do it in a dry dock and the other one was to do it subsea. They were planning to raise the legs as high as possible and then add the part under water. Engineers of the manufacturer then had to come on board to safely raise the legs above their normal height.

What calculations and assessments are made before the Neptune, or another jack up vessel goes to a location to start a contract?

For jack up it is really important that you have a proper site specific assessment. That mains that they go to the place and they make a borehole. They know the vessel, the characteristics, they know the friction, how much pressure we push and that kind of stuff. They will give you an estimate of how much they expect the leg to penetrate in that location. Regarding the characteristics of the leg and the pressure that you are pushing on them during the preload. So you see the different geological layers, if you have mud, sand, sometimes you can see the change between the glacial and non-glacial age. When you start to preload, you will push the leg in the soil and you want to reach a strong layer, a layer at which the vessel will not move, so that you can go up and not move. And that you can keep the vessel stable and strong during

the lifting operation. Because when you start to move a weight of 200 tons around with the crane you will have a big change in your centre of gravity. And you want the platform to be stable.

Can you tell me a bit more about a punch through?

That is the worst thing that can happen. So basically what it is when you have pushed and put your legs as deep as possible, as good as possible. Then you go out and you start your operation but the ground under one of the leg is actually not that stable and slowly the pressure of the weight of the vessel on that specific point start to pierce trough the layer and then the vessel starts to incline. You can have it slow or rapid and that is a big problem. A while ago we had a small one in the port of Antwerp, but it was controllable, we were still in the preload and then you see it. you have a drop of pressure on one of the legs and then you have to push that leg as fast as possible in the ground so that you can keep the vessel upright. And then you have to redo the preload. In this case we were still on the water but when you are up you will have to try to go down if it is still possible. To reach of the water. So the reaction to a punch trough is more operative dependant and depending on the condition. But that is a really bad thing to happen. That is why we test the ground. As for the manual of the vessel, we have to test it minimum 30 minutes per pair (legs). So we when we preload, we preload per pair. We do 1 and 3 and then 2 and 4 and we test them for 30 minutes at the end of the preload. And we consider that it is okay only if after these 30 minutes waiting and pushing the maximum pressure we can push, we don't lose pressure, we don't change angle of the vessel. Then okay, you have a good chance that it is okay. But sometimes it can happen that anyway you will have problems, you have especially these kinds of problems when you have footprints of a previous jack up. Because off course they all push at a different pressure, depending on the spudcan and the weight and size of the vessel. The problem is that they have compacted the soil at that place. So it is important to know when you are in a footprint that is why bathymetric studies are so important. When you are in the footprint of another vessel you want to push a bit more because you want to pierce this compact layer that is been compacted by the previous jack up. And try to go under it, because for example, let's say Innovation is a really big vessel. It also has gigantic spudcans, so he has made it's preload. Because of the huge spudcans he has spread the weight of the vessel over a way bigger surface. So he actually has put less pressure, but he compacted the soil. If we come and we have one leg in a footprint of the Innovation then we have to push and have to make sure that we go through the layer that the Innovation has compacted because we push more than the innovation. This is

one thong but you can also have another problem, if you are close to the footprint of another vessel it can happen that your leg can slip in the existing footprint, this is really dangerous when you have no penetration in the soil. This was the case a while back in the gulf of Mexico. Then you have the risk that the vessel will collapse. So that is also something to take into account. So it is really important when you go somewhere to have a good soil investigation, so that you know what you are going to reach. So the penetration, what kind of soil it is and also it is important that you have a good bathymetry. That is why we have this GPS system. This is what the company gave us. It is a drawing with the bathymetry all around. So for every point as you see, you have the dept. The system is all connecting together. And the systems knows, because you have a really precise GPS system from the DP. The systems knows exactly at what height is the hull of the vessel, he also has models of the tide because you have to take into account the height of the tide, it knows what is the water depth, he knows how much leg there is under the hull and so it is able to calculate the penetration the leg into the ground. So we follow this. And here you also can see the footprints of all the vessels.

In the specifications of the vessels it states that there are 5 moon pools here. Why are they used?

Okay, so you have moon pools here. The big ones are deck hatches and are used to go under for example to drop some pallets and some equipment’s or stores. And the small ones are moon pools and basically they go through the complete hull. The usage of these is up to the client, sometimes they want to take some samples, drop something or drill a hole. We also use them to lower some positioning equipment, like for example can be used with positioning systems for a ROV, we can drop the beacon to follow where it is, related to the ship. Sometimes it is also used to throw some water over board, there are small moon pools.

Can you describe a typical jacking operation?

When you are in a jacking operation, positioning alongside the structure is a coordination between the DP operator and the jacking operator. The 2 systems work together in the first phase. They influence each other: when can you lower the legs, the legs have an effect on the DP, the DPO has to keep the vessel in a certain position and then also the jacking operator is telling to the DP what he is doing and vice versa because at some point the legs will touch the ground. From the moment the legs touch the ground, the DPO has to be informed because it is really important that we need to freeze the current. Because what is happening is that we are never in the exact position, in good condition it is within 10 centimetres and when it is moving a bit it is within 20 centimetres. Which is really good because positioning 6300 ton vessel within 10 centimetres is not easy. It is a strong vessel. So from the moment we have touched the ground, let's say we are 5 centimetres of the DP target, the DP system is saying 'I'm not there, I want to go to my point', so it starts pushing on the thrusters, but we are not moving because we already have touched the ground. So he gives more thruster and you want to avoid this because otherwise the engine can give such a trust that can cause the dragging of your vessel and then you can make a jump, hit a structure or an underwater cable or something else. So from the moment we touch, you freeze the current and then the DPO knows he cannot counteract any other environmental parameters, from the moment we touch we freeze these parameters and then he will not thrust more than he needs to. He will just counteract these freezed parameters. And it is the same story when we go away, you have to be in coordination because itis risky and you have to make sure that you for example don't hit a structure when going away so the DPO has to know at what moment he has to counteract the current. It is for example good practise to move away from offshore structures when you are in a blow off situation. You can find more information about this in the GOMO. So this means that when we are going away we try to have the current pushing us away from the structure, off course this is not always possible, it depends from your position towards the structure. Like in most cases the big ones have already the good spots. We mostly have the current crosswise so from the front to the back or from the back to the front. That is why we have such a strong vessel. And then you have to decide what is the best moment regarding the position of the underwater cable and this kind of stuff and then you go away. To go away there is a IMCA guideline, this is not company constricted. The assure guidelines for the jack up DP. It takes into account a lot of different situation an gives you guidelines of how to go away. Every case is different. Okay continuing my story, we receive the bathymetry, the hydrostatic data, we have the admiralty tide table and they gives us a general idea of what will

be the current at what time but this is only mathematic so except if the client himself recorded the data on the side you have to crosscheck it because most of the time you are at a special position and you can have some offset. So for that we have what we call a current-fish, this is like a torpedo that we drop into the water and this is giving us the direction and the speed of the current and then we crosscheck this and we make sure that we are in the correct situation. We look what kind of offset we have from the data. And then we can validate the data and choose the right moment and off course you should not forget to take it out because otherwise it will go into the thruster. On a jack up vessel it is also really important to monitor the environmental conditions not only you have to be inside the design limitations of the vessel but you must also stay within the limitations that are decided for the specific project by the insurers company and the client regarding the cargo. So the wind speed has an importance but for us the most important thing is the period of the swell and the height of the waves because you don't want the vessel when you are positioning for jacking or going away, you don't want the vessel to start banging in the waves because otherwise, especially when you have a hard soil like the sand or something like that. You don't want that because of the rolling or pitching of the vessel that the legs start banging on the seabed because then all the shocks are coming up in your structure and it can damage the support of the jacking system but also the hydraulic cylinder and everything. You have to be careful with that. When the conditions are bad the captain, the maritime surveyor, the client, project engineer will have a meeting on the bridge and then they will decide if they will take the risk or not. That is why the weather forecast is really important for us and that is why we get different ones. We never only use 1. We look at all of them. This ship is also fully equipped with weather monitoring equipment, we have 2 wave radars, wind sensors. So we cross monitor all this. The weather is not only important when sailing and during the jacking operation but also when using the crane. What you have to see is that we are really high when we start working at the windmill and then you have to take into account what the wind speed is at 100 metres or 150 metres for example. That is where the job is. So before a project it is important that you have a ship in a good condition, a good SSA, a good bathymetry, good hydrographic data’s, good weather forecast and monitoring equipment.

When comes the DPO on board?

Here we are all DP officers. Here we do a 12/12 shift so there are always 2 officers per shift and both of them are DPO, because it is a IMCA regulations that during an operation , for safety, that we need 2 DPO's. Here we are all DPO and we are also all operating the jacking system. We change from time to time because it is important that when you are doing the jacking operation that you understand the DP and vice versa.

You have jack up platforms and jack up vessels, what is the main difference?

This is a vessel, We can sail like a normal vessel. We have an IMO number, and every other thing that is required on a normal marine vessel. You also have jack up barges, you see a couple over there. Those vessel don't have their own propulsion so those on is basically a pontoon that you tow with a tugboat to the place of the operation and then you jack it up and it is ‘finito’. They need a tugboat, some can position with anchors, others cannot so they have to be towed by a tugboat. That is the main difference. This is a real vessel so it is SOLAS, it is completely following all the rules of merchant vessels. A jack up barge is different, they will follow the rule of the MODU. It is a different code, it is also issued by the IMO but it is a code that is made for the platform, the non-sailing vessel. With the DP system you save a lot of time, it is also very precise but it is also possible to position very precise with anchors or tugboats. This is more time consuming and it also means that you need tugboats, one or two, you will have to pay a lot of fuel so it also more cost effective to use a DP vessel, it is also faster. Nowadays jack up vessels are mostly used to install wind parks and this is a lot of small structures. This means that you have to move often to another location in the same park. You have to do many locations in one trip. You don't want to lose time because you have a lot of running cost. So you want to be able to move as fast as possible to your next location by yourself because time is money. So that is why the barges are not used anymore, maybe only for small jobs but not in the wind parks.

Can you explain the jacking system a bit more to me?

So basically as you see, this is the jacking console. That is the joystick that you use to control the movement of the piston and the cylinders so how you move the legs up and down. And how you move the vessel up and down the legs. Because these are 2 different things. What is important to understand is the transfer of weight that will operating between lifting or lowering the legs and lifting or lowering the vessel on the legs. Here you can select the program because we have different programs which reaches a different pressure and those programs are depending on what you are doing. Let me describe a typical operation. The system is warm, running. We open the main shut off valve. And we are on DP and then we will start by lowering the legs. So we lower the legs, we will try to move them all together except if you know that you a big difference in the bathymetry then you will try to align your legs so that they have the same difference as you have on your bathymetry because you want them to touch the ground all at the same time. So you continue and keep an eye on the pressure and from the moment they will touch you will see this value dropping because there is the transfer of weight. So you know that you have touched and you tell it to the DPO. He then freezes the current and maintain the position. I forgot to say: when you position you don't lower your last stroke to touch the ground before the DPO has told you that he is happy, and that you are in the good position.

So we stop the lowering just above the ground. And then the DPO positions the vessel as close as possible to the target. And then the DPO will inform the jacking operator that he is at the position and then you can lower the legs further. And when the legs touch the ground the jacking operator says to the DPO that there is contact with the ground. And then we freeze the current and continue the jacking. You go to the end of your program and then you change your plan, you reduce your draught. You see that you want to go to the end of your program because it is always changing the pressure that you put and as you see here it is also changing where the pressure is coming from, is it coming from the top or from the bottom? That program is when the weight transfer is happening, the weight transfer from lowering the legs so holding the legs and holding them and when they touch and then the moment when you start to put the weight of the vessel on the leg, so pushing on your leg, so your legs start penetrating, you keep continuing. Until you reach the layer you want to reach. Then you change your program again, you chose the pontoon lifting. You continue but you stay in the water, because you have your cooling system that is running so what is happening is that normally this vessel has a draught, when you are loaded and in operation, around 3,6 metres

let's say plus the thrusters because the thrusters are under the hull. So the total draught is 7,2 metres let's say but we have 3,6 metres hull draught, okay? But there is the sea inlet for the cooling water for the generators, so off course when we go out of the water, we will put this out of the water. So at the point, that mostly corresponds with the end of 'the increase draft program', when you are somewhere between 1,8 - 2,3 metres draught, you stop. We stop the engines, because that is good, that means that you are already good in the ground and that the vessel will not move. You are still in the water, a bit floating here and there but not completely, a part of the weight is on the legs and a part of the weight is on the hull. And you stop your engines, so the DP part is finished. And then engineers will go to the back of the vessel and they will lower these big hose that you see. Because they need to transfer the cooling water from the sea chest to the hose and reel pump. Because when you go out of the water, off course you cannot suck the seawater in. So you will take the cooling water through those hose and reel pipe. On this vessel it is a hose and reel but on some other vessel it is somewhere in the leg or it is a big pipe that goes through a moon pool. It is a different system on different jack ups. And then you start again when they say you that the system is up and running. Then you continue, you raise just, let's say, 60 cm of draught or something like that and then you start your pre- preload because you don't want to have a punch trough or have a problem when your ship is out of the water, you want to start already to test your soil as much as possible when you are still in this position. And then in case you have a problem you can quickly go back in the water. But this is something you do because you have a hydraulic system, you don't do this on the other vessels as far as I know. Because with the hydraulic system with only 60 cm of draught, you can already reach the maximum pressure but that is something that you don't have on the other vessels. So you do that, you test your soil, you push and push, always crosswise. Then when you are happy, your pre- preloading is done and the vessel is not really moving your ship out of the water. And then you go a bit up and then you will do another preloading. What I tell you here is what we do here, it is not really by the book. We already do the pre-preload with the maximum pressure because we want to be sure. So you go a bit up and you redo your preloading, one more time. This is the long preloading where you will test each pair for minimum 30 minutes, also depending on the site. Sometimes it can go up to 1, 2 or 3 hours. We sometimes do a preloading of 6 hours. If you see that it is still moving, if you see you lose pressure, that means that is not good and you continue, for the safety of the operation. You do that pair by pair and when you are happy, when you made sure that it is not moving anymore. Then you can go up to your walking height. The program is then the pontoon lifting mode. When you go down, you go to the pontoon lowering mode,

you reach the water level. Then you go to the 'increase draught' at some point you stop. Because you want to change again to the sea chest. They retract the hose and reel and you make sure that they are out of the water before you start your thruster. And you continue, then you go in the water and you take your draught and after that you start the leg pulling. That means that you will have an extra power that will make it possible to extract your legs. You do it crosswise, by pairs. Sometimes they get stuck, and that is something that you don't want. So if they get stuck, we have the jetting system. What we do is we basically connect those pipes on the another pipe that is inside of the leg and that goes through the whole length of the leg to the bottom. And there you have nozzles and we inject water with pressure and high flow under each leg. And with this what is happening is like you have a boot and your boot is stuck in the mud. If you pull too much then your boot is staying in the mud and you end up stuck, it is the same for us. So by injecting this water you fill up the gap and you also lubricate the side and you remove a part of the friction. You extract your leg from the mud. After this you continue your leg pulling and when your leg gets free from the ground, you see it on the pressure, it is all about which pressure you see. When you see that it is dropping, that is okay. It means that the leg is out of the ground and you only have the weight of the leg on the cylinder. Then you take everything inside and it is finished. You have to speak with the DPO because you go away on DP. If you know that you may have a problem for extracting the leg with the jack up, it is really important that you don't get stuck with low tide because if you are stuck and the water is rising then you will transform your ship into a submarine. So you always, when you have a big penetration and you know that you are going to use the jetting system then you always do that around the high tide.