Description

Offshore platform and control method for offshore platform

The invention refers to an offshore platform according to the preamble of the patent claim 1 and a control method for such offshore platform.

In the course of the increased use of alternative energy sources, wind turbines for instance become more and more important. By end of 2009, a so-called offshore-windpark was put into operation off Borkum, whose wind turbines ('WKA') are anchored on the seabed beyond the range of vision from the coast. The installation of this WKA is carried out e.g. by means of an offshore platform, which is supported by a number of columns resting on the seabed and which can be hauled out of the water for the installation of the wind turbines.

In the patent GB 838, 627, an offshore platform is disclosed, where the relative movement between the column and the platform takes place by hydraulic cylinders, which can be interlocked with the corresponding column and then move the platform upward along the columns by pulling-out or – in kinematic reversion – move the column relatively to the floating platform. After a stroke of this cylinder, the cylinder end at the platform side is interlocked with the column and the other cylinder end is unlocked, so that the hydraulic cylinder can be pulled in for the next stroke. After that, the interlocking with the column will be repeated, so that the platform can be lifted with the cylinder stroke in the next interval. Such step-by-step operation is time consuming. This is particularly problematic in offshore applications, since the platform is during the procedure relatively susceptible to waves and suchlike. Moreover, the WKA can be installed only in fair weather conditions, so that unproductive periods, being caused by the method of the offshore platform, shall be avoided.

In order to get rid of this disadvantage, an offshore platform is described in the patent US 4 497 591, where the adjustment is carried out by a rack-pinion mechanism. Here, each column is assigned to two hydraulic cylinder pairs, whose piston rods are connected to one pinion each, combing with a tooth pitch at the column. These pinions can be blocked with an interlocking system. The cylinder casings of these hydraulic cylinder pairs are each connected to the platform. By pulling the cylinders out and in, the platform can be raised or lowered while the pinion is interlocked. In doing so, either cylinder pair works for the platform adjustment, while the other cylinder pair is pulled back into its starting position while the pinions are unlocked, so that during the pulling through of the stroke of the first cylinder pair the pinions of the other cylinder pair being pulled back into the starting position will be interlocked, so that subsequently the platform can be raised or lowered by this cylinder pair – i.e. only one cylinder pair is engaging while the other cylinder pair will be pulled back to its starting position. With such kind of solution, a fairly continuous movement of the platform can be set.

In the patent US 3 722 863, an offshore platform is shown, where instead of the complicated rack-pinion mechanism a rather more robust solution is depicted, where the relative adjustment between the platform and the columns is also done by means of hydraulic cylinders, which are engaging alternating. In this solution, the platform is supported by hydraulic cylinders, whereby their piston rods are interlocked with catches with the tooth pitch of the column. An analogous interlocking is also provided for the platform, so that the platform can be directly locked with the corresponding column. In this variant as well, the hydraulic cylinders or hydraulic cylinder pairs are alternating controlled, in order to ensure as continuous as possible movement of the platform or the columns.

If such offshore platforms were used, it appeared that the transfer of the load from the cylinder/cylinder pair, which is currently engaged with the column, to the other one, which is being pulled back, causes some problems. In the case, where

the cylinder being at its stroke end is locked before the load transfer and only then, i.e. when the other cylinder is unlocked after the interlocking, the initially described discontinuous movement of the platform appears with the associated disadvantages. In the case, where the interlocking of the cylinder being engaged overlaps with the unlocking of the overtaking cylinder, discontinuities in the platform movement may appear as well, so that these cylinders and the associated drive components can be damaged due to the changing moving speed. Such undefined movement conditions must be avoided especially in case of high waves and strong wind.

An option to optimize the moving speed of the platform is to set the pulling-out speed of the hydraulic cylinder during the movement between the stroke end points (cylinder pulled in, cylinder completely pulled out) by the factor 2 or 3 higher than the desired average moving speed. However, there is the problem that the columns are not supported on the same seabed level because of the uneven seabed, so that, for instance with four columns for one platform, the hydraulic cylinders being assigned to each column are locked at different stroke positions in relation to the platform. This means that all cylinders of the specific columns will not reach their final stroke position or their starting position at the same time, so that with the increased speed in a stroke range, which is overlapping for all cylinder arrangements, the overall average movement speed of the platform cannot be improved much. Another shortcoming of this solution is the fact that high hydraulic power is needed because of the sharp acceleration in the mentioned stroke ranges.

In contrast, the aim of the invention is to provide an offshore platform and a control method for such offshore platform, facilitating as continuous as possible relative movement between the platform and the column.

This aim is achieved regarding the offshore platform by the combination of characteristics of the patent claim 1 and regarding the method by the characteristics of the further independent patent claim 12.

Favorable advancements of the invention are subject of the subclaims.

The platform according to the present invention has a number of columns, which can be lowered down to the seabed by means of a hydraulic lifting device in order to raise the platform above the sea level. At least two hydraulic cylinder sets are assigned to each of these columns, whose pressure chambers can be connected by a valve device with a pump system or runback. The hydraulic cylinder systems on the one hand are held at the platform and on the other hand can be connected detachable to the corresponding column by an interlocking device. In addition, the platform has a control unit, by which the cylinder sets can be controlled in the way that during a relative movement between platform and column one of the cylinder sets is locked with the column by the interlocking device, while the other cylinder set is unlocked and is pulled back to the starting position, in order to be locked then with the column for assuming the load. For making this load-assumption as "smooth" as possible without any discontinuity of the platform movement speed, according to the present invention the pressure agent volume flow to the load-assuming cylinders is for a short while increased by the control unit during the load-assumption as compared to the pressure agent volume flow, which corresponds to the projected moving speed; the pressure agent volume flow to the load-transferring cylinders being at the stroke end is accordingly reduced, so that the hydraulic output is almost constant.

By this way, the shortcomings of the above described state of the technology are omitted, so that the relative speed between column and platform can be kept basically constant during the whole stroke. Hence, the platform can be moved continuously with relatively high speed, whereby the position of the columns on the seabed will not influence the platform speed, because the cylinder sets being

assigned to each column are controlled individually according to the present invention.

The method according to the present invention facilitates the movement of the platform in the above described way. After the load-assumption, the pressure agent flows to the previously load-assuming cylinders (then active cylinders) and to the previously load-transferring cylinders (are pulled back into the starting position) are set back to the value, which is designed for the projected movement speed.

With the platform according to the present invention it is favorable, if the load-assuming and the load-transferring cylinders are assigned to one pump each with variable displacement volume, so that the setting of the pressure agent volume flow can be made individually.

Both pumps may have a common motor, which is preferably an electric motor.

Each pump can principally be made by a number of small units being connected in parallel, which have a common drive motor or which are provided each with small motors.

In the preferred design example, each cylinder set has at least one, but preferably several cylinders, which engage together at the column.

For the interlocking, a lock may be assigned to each cylinder set, e.g. a twistlock, which is releasably engageable in interlocking engagement with one of the numerous interlocking mountings at the column. These interlocking mountings are located one after another in lifting direction along the column.

The interlocking takes place in a very simple way, if the lock bolt is pre-stressed, so that it can automatically engage by overlapping with a matching interlocking mounting.

The control of the platform is simplified, if the interlocking engagement is monitored with sensors.

Since high pressure may occur depending on the load case in the pressure chambers of the cylinders, each pressure chamber has a pressure control valve to prevent overloading.

In the method according to the present invention it is preferred that the pressure agent flow during the load-assumption is controlled in the way that the hydraulic power or the speed of the platform remains almost constant.

The pressure agent flow can be increased during a period, amounting to approx. 5 to 20% of the length of the lifting interval, preferably around 20 seconds at a lifting interval of 180 to 240 seconds.

The unlocking of the load-transferring cylinders takes place, when their load has fallen below a predefined limit.

Preferred design examples of the invention are described further in the following by schematic drawings. It is shown:

Figure 1: a schematic drawing of an offshore platform in various operational conditions;

Figure 2: a schematic drawing of a lifting device of such offshore platform;

Figure 3: a hydraulic circuit of the lifting device from Figure 2 and

Figure 4: a variant of hydraulic circuit for the lifting device.

Figure 1 shows the basic design of an offshore platform according to the present invention, called platform 1 in the following. Such platform 1 may be built as barge with its own drive system or as towed platform – like an offshore drilling rig – and has a working platform 2, carrying the working tools required for the construction. This working platform 2 can be supported on the seabed 6 with a number of columns, e.g. three, four or six columns 4 – as shown in Fig. 1b – and then can be raised above the sea level 10 by the lifting devices 8 along these columns 4, in order to perform the necessary construction works, e.g. the installation of the WKA. During the journey to the operation site, the columns 4 are lifted above the seabed 6 by the lifting devices 8 as shown in Fig. 1a, whereby the lifting devices 8 – as further described in the following – are loaded with pressure.

When the platform 1 has arrived at the operation site, the columns 8 are lowered according to Fig. 4b, until they are supported by the seabed 6. With the lifting devices 8, the working platform 2 is raised from the sea level 10 as shown in Fig. 1c and brought to the predefined working position. In this condition, the lifting devices 8 are strained with a relatively large tension force as shown in Fig.1, while in the transitional state according to Fig. 1b the load of the lifting device 8 changes from pressure to tension. The lifting devices 8 are loaded in case of raised columns only with minor pressure force corresponding to the columns' weight.

Fig. 1d shows a condition, where the column 8 on the right hand side of this Figure is pulled out by the lifting device from the seabed 6, while the other columns are still resting on it – a major force is necessary to pull out the columns 4 from the ground – this force puts pressure on the lifting devices 8. During the lifting of the columns 4, this force is significantly lower, because only the column weight needs to be held.

Therefore, depending on the operational condition the hydraulic lifting devices 8 according to the present invention are loaded in the 4-quadrant operation with different forces and movement directions, which must be considered in the control of the platform 1. These forces are further explained in the following.

As further shown in Figure 1, several lifting devices 8 may engage at each column 4, so that the generated forces are passed as symmetrical as possible.

The basic design of the lifting devices 8 is in the following described in the schematic drawing in Figure 2. It shows in very schematic form a section across a column 4, at which the working platform 2 is held. The lifting device 8 has at least two cylinder sets 12, 14, each being formed by one or several, preferably two cylinders, which engage staggered in lifting direction at column 4 or platform 2 respectively. In the shown design example, the two cylinder sets 12, 14 each with their cylinder casings 16, 18 are held at platform 2, whereby this support is preferably hinged, in order to balance little relative shifting between platform 2 and column 4, being caused by waves. In the cylinder casing 16, 18, one differential piston 20, 22 each is provided, whose piston rod engages at a cross beam 24, 26, whereby this connection is hinged as well.

By the differential piston 20, 22, each cylinder casing 16, 18 is divided in a bottom chamber 28, 30 and a ring chamber 34, 36. At each cross beam 24, 26, an interlocking device 37, 38 is provided, by which the corresponding cross beam 24, 26 can be locked with the column 4. In the concrete design, each interlocking device 36, 38 has one or several twistlocks 40, 42, which can engage for interlocking in corresponding recesses 44, 46 of the column 4. According to the drawing in Figure 2, the interlocking device 36, 38 is symmetrical to the column axis 48, so that the forces are passed symmetrically. For instance, another cylinder of the cylinder set 12 may engage at the right side in Figure 2 of the cross beam 24.

In principle, several of those cylinders may be mounted at the perimeter of the column 4 and assigned in groups to one cross beam.

In the design example according to Figure 2, the interlocking device 38 of the lower cross beam 26 is not engaged with column 4, while the hydraulic cylinders 12 are locked by the cross beam 24 with column 4. During the interlocking, the relevant cylinders 12, 14 are strained with tension by the weight F of the platform 2, so that corresponding high pressure forces are put on the ring chambers 34, 36.

For the lifting of the working platform 2 from the sea level 10, pressure agent is – as further described in the following – conveyed into the ring chamber 34 of the cylinder 12 being interlocked with column 4, so that the ring chamber 34 expands and the bottom chamber 28 decreases accordingly – the cylinder casing 16 and thus the platform 2 is moved up and raised as shown in the drawing of Figure 2.

In the meantime, pressure agent is conveyed into the bottom chamber 30 of the unlocked cylinder set 14, so that the differential piston 22 pulls out until the twistlock 42 overlaps with the next recess 46 in pull-out direction. This position is just reached in Figure 2. In this position, the load-bearing cylinders 12 have almost completed their stroke, so that for the further move of the platform 2 the twistlock 42 of the load-assuming, pulled-out cylinders 14 is brought into interlocking engagement with the recess 46 of column 4 and accordingly the twistlock 40 of the load-transferring, completely pulled-in cylinders 12 is unlocked, so that their differential piston 20 can be pulled out, in order to bring the twistlock 40 into interlocking engagement with a recess of column 4, which is above the recess 44 and not depicted. By this alternating control of cylinders 12, 14, the platform 2 can be raised along the columns 4. Accordingly, by suitable control of the cylinders 12, 14, the other operational conditions are controlled as shown in Figure 1. Up to this point, this control corresponds mainly to the approach, which is known as state of the technology.

However according to the present invention, during the load transfer from cylinders 12 to cylinders 14 the pressure agent flow is increased in the ring chamber 36 of the load-assuming cylinders 14 as compared to the pressure agent flow, which is required for the predefined moving speed of platform 2. The pressure agent flow to ring chamber 34 of the load-transferring cylinders 12 is reduced accordingly, whereby in this transitional state both cylinder sets 12, 14 are locked with column 4. This increase or decrease of the pressure agent flow to the ring chambers 34, 36 of the cylinders 12, 14 takes place during a relatively short period as compared to the whole stroke of one cylinder set 12, 14. For instance, while the pulling in of the load-bearing cylinder set 12, 14 takes three to four minutes, the abovementioned change of the pressure agent flow during the load transition phase is set to around 20 seconds. Of course, deviations from these timings are possible, because they always depend on the current environmental conditions and also on the geometry and weight of the system.

During this change of the pressure agent flow, the load is gradually assumed by the faster pulling-in, load-assuming cylinder set 14, while the load of the transferring cylinder set 12 decreases slowly because of the lower moving speed – if this load has fallen to a predefined limit near zero, the load-transferring cylinder set 12 will be unlocked and pulled out again – the cycle can restart, whereby the control of the pressure agent flow according to the present invention facilitates an almost continuous moving speed of platform 2 and column 4 in relation to platform 2.

Figure 3 shows a hydraulic circuit for the control of both cylinder sets 12, 14 in the abovementioned way.

As described, the control of the pressure agent flow according to the present invention requires in the transitional phase the increase of the pressure agent flow

to the load-assuming cylinder set 14, while the pressure agent flow to the load-transferring cylinder set (here cylinder set 12) will be reduced accordingly, so that the hydraulic power and thus the moving speed of the working platform 2 remain almost constant.

According to the circuit in Figure 3, an individual variable pump is assigned to each cylinder set 12, 14, which is driven by a common motor, preferably an electrical motor 54 as shown in the design example. The pumps 50, 52 are preferably volume-controlled, so that even in different load conditions the predefined pressure agent flow is ensured. The pressure connection of the variable pump 50 is connected with an intake pipe 56 to the ring chamber 34 of the cylinders 12 and with another intake pipe 58 to the bottom chamber 28 of the cylinders 12. In each intake pipe 56, 58, a control valve 60, 62 is provided, which can be controlled by a control unit not being shown, in order to open or close the pressure agent connection between the variable pump 50 and the ring chamber 34 and bottom chamber 28 respectively.

In addition, the ring chamber 34 and bottom chamber 28 are connected with a drain pipe 64, 66 to a tank T, from which the two variable pumps 50, 52 suck pressure agent. In each drain pipe 64, 66, a pressure relief valve 68, 70 is provided, by which the pressure can be limited in the related pressure chamber 24, 28 to the predefined maximum value. Suitable pressure relief valves are described in the data sheet RD 21050/02.03 of Bosch Rexroth AG, to which reference is made for simplification purposes. A special feature of the circuit is the fact that these pressure relief valves 68, 70 can be adjusted by the control unit, in order to change the limitet pressure depending on the operational condition of the cylinders 12. The pressure in the pressure chambers 28, 34 and 30, 36 is detected each by a pressure sensor 71, 72, 74, 76 and communicated to the control unit not being shown, so that the pressure relief valves 68, 70 and the above described interlocking devices can be controlled depending on the pressure in these pressure chambers.

The branch being assigned to the cylinders 14 has the same design as the above described branch of the hydraulic cylinders 12, i.e. the variable pump 52 is connected with an intake pipe 80, 82 and control valves 84, 86 therein to the ring chamber 36 and the bottom chamber 30 respectively. These can be connected with drain pipes 90, 88 and pressure relief valves 92, 94 to the tank.

As shown in Figure 1, the lifting devices (cylinders 12, 14) are loaded with different forces depending on the relevant operational condition.

For instance, if in the operational condition as shown in Fig. 1a the column 4 is lowered with floating working platform 2, the active, locked cylinders 12, 14 are loaded with a negative, pulling force, whereby pressure agent is conveyed into the relevant ring chamber 34, 36.

For lifting the working platform 2 with columns 4 resting on the seabed (Fig. 1b, 1c), there is very high pressure in the ring chamber 34, 36 of the active cylinders 12, 14 due to the heavy weight F of the working platform 2 – the cylinders 12, 14 are loaded positively (with tension). The pressure agent is also conveyed into the relevant ring chamber 34, 36.

For lowering the platform above sea level, there is still high pressure in the ring chamber 34, 36 of the active cylinders 12, 14; however, there is a pulling force caused by the lowering and the pressure agent must be conveyed into the bottom side 28, 30 of the active cylinders 12, 14.

For lifting the columns 4 from the seabed 6 into the travel position, only a relatively little force is required, so that the pressure in the bottom side 28, 30 of the active cylinders 12, 14 is also low. There is a positive load and the pressure agent is conveyed into the relevant bottom side. However, it has to be noted that the force in the bottom side during the pulling out from the seabed 6 can be significantly higher, as described.

According to these load conditions, the cylinders 12, 14 are controlled in the so-called 4-quadrant operation, whereby very different pressures may occur in the respective pressure chambers. In the conventional solution according to patent GB 838, 627, one pressure relief valve each is located in the drain pipe of the hydraulic cylinders – however, this is set to a value, being oriented on the maximum pressure, which occurs during the lifting of the working platform – this pressure is significantly higher than the pressure in the other operational conditions (floating platform, pulling out or pulling in of the columns), so that in these operational conditions the pump must generate a very high pressure, in order to open each pressure relief valve located in the drain pipe – the associated throttling losses are significant.

In the solution according to the present invention, these disadvantages are discontinued by the adjustability of the pressure relief valves 68, 70, 92, 94 during the operation depending on the relevant load condition. In the load condition according to Figure 1c, the pressure relief valve 70, 94 located in the drain pipe is set to the high pressure, which occurs due to the heavy platform weight. During the lowering of the platform, this high pressure setting is effective until the platform hits the sea level and hence only the weight of column 4 puts pressure on the relevant active cylinders 12, 14 – then, the pressure relief valve 70, 94 located in the drain pipe is set to a lower value, in order to minimize the throttling losses. Accordingly, the pressure relief valves 68, 92 located in the drain pipe are set during the lifting of the columns 4 from the seabed 6 to the occurring lower pressure. Such low pressure is set e.g. also after the unlocking of the cylinders 12, 14 and the pulling out of the relevant cylinders 12, 14, in order to minimize the throttling losses.

The setting of the limited pressure takes place according to the present invention depending on the relevant pressure in the pressure chambers, which is detected by the pressure sensors 71, 72, 74, 76 and evaluated by the control unit. The pressure to be limited is set by a predefined pressure difference higher than

the pressure being expected in the pressure chamber on its drain pipe side.

The variable pumps 50, 52 are controlled in the way that the speed and also the position of the working platform 2 can be kept constantly, whereby it must be considered that the individual columns can be supported on the seabed in various heights, so that the cylinder sets 12, 14 being assigned to each column 4 need to be controlled individually.

During the reversing of the pressure relief valves 68, 70, 92, 94 it must be observed that the change to the lower pressure is not too early, because the acting load cannot be held . On the other hand, a change to lower pressure coming too late results in unnecessary pressure losses, as they always occur in the current state of the technology.

By the control of the pressure relief valves 68, 70, 92, 94 in the drain pipe according to the present invention it is ensured that the respective cylinders 12, 14 are pre-stressed in every operational condition, whereby this pre-stress is set depending on the acting force.

The respective cylinder force to be generated by the cylinders 12, 14 is calculated with the active bottom surface size of the respective piston multiplied by the pressure at the bottom side minus the product of the pressure at the ring side and the ring surface size of the respective piston.

The limited pressure on the bottom side is calculated accordingly with the piston force divided by the bottom surface size (pressure on the bottom side) plus the above described safety pressure difference. Accordingly, the limited pressure on the rod side is calculated with the load F (mind the algebraic sign) divided by the ring surface size of the piston (pressure in the ring chamber) plus the above described safety pressure difference.

By the appropriate setting of the pressure agent volume flows and the pressure relief valves in the drain pipe, a continuous relative movement between the columns 4 and the working platform 2 is ensured, whereby very high moving speeds can be set.

In the above described design example, two variable pumps 50, 52 are driven by a common motor.

Figure 4 shows a variant, where a separate pump 50, 52 with its own motor 54a, 54b is assigned to each hydraulic cylinder set 12, 14. These pumps 50, 52 may be designed as variable pumps. In the shown design example, constant pumps are used, whose volume flow is changed by the rotational speed of the motors 54a and 54b, for setting the predefined pressure agent volume flow. For the rest, the design example in Figure 4 corresponds to that one in Figure 3, so that by referring to the respective descriptions further explanations can be omitted.

As already mentioned, instead of a single, relatively large pump 50, 52 a number of smaller pumps may be used, which are driven by a common motor or driven by one motor each for changing the pressure agent volume flow, so that single pumps in a pump set may be switched off for changing the pressure agent volume flow.

The pumps may be controlled by a volume or pressure control.

In the above described design examples, the cylinders 12, 14 are arranged in such a way as to be loaded with tensile force when the working platform 2 is lifted. However, the concept according to the present invention may be applied in the same way with constructions, where the working platform 2 is supported on the cylinders 12, 14, so that they are loaded with a compressive force . Due to the high loads of the piston rod, in such solutions the cylinders 12, 14 are loaded with extremely high

critical buckling forces, so that the suspended support according to the described design examples is preferred.

However, in the control of the pressure agent volume flows it must be observed that after the load-assumption the ring chamber of the load-assuming cylinders 12, 14 is very small and the ring chamber of the load-transferring cylinders 12, 14 has maximum size – the corresponding compression volumes and different pressure changes caused by feeding of pressure agent in a small and on the other hand much bigger pressure chamber must be considered.

An offshore platform and a control method for such offshore platform are disclosed, where a working platform is supported on the seabed by several columns. The columns are coupled with the working platform by lifting devices, whereby each lifting device has two lifting cylinder being staggered to each other, which engage alternating. According to the present invention, the load-assuming cylinders are supplied with higher pressure agent volume flow for the load-assumption, while the pressure agent volume flow to the load-transferring cylinders is reduced accordingly.

Claims

1. Offshore platform with a number of columns (4), which can be lowered to the seabed for the lifting of the platform (2) from the sea level (10) by means of a hydraulic lifting device (8), whereby the lifting device (8) has for each column (4) at least two hydraulic cylinder sets (12, 14), whose pressure chambers (28, 34; 30, 36) can be connected by a valve device (60, 62; 84, 86) to a pump set (50, 52) or a drain pipe (64, 66; 88, 90) and which on the one hand are supported by the platform (2) and on the other hand are detachably connected with an interlocking device (37, 38) to the column (4), and to a control unit, by which the cylinders (12, 14) can be controlled in the way, that during a relative movement between platform (2) and column (4) the cylinders (12, 14) are locked by the interlocking device (37, 38) with the column (4), while the other cylinders (12, 14) are unlocked and pulled back into starting position and then can be interlocked with column (4) for the load assumption, **being characterised that** by a control unit the pressure agent volume flow to the load-assuming cylinders (12, 14) during the load assumption is increased for short while as compared to the pressure agent volume flow corresponding to the projected speed and the pressure agent volume flow to the other, load-transferring cylinders (12, 14) can be reduced accordingly, so that the moving speed of the platform (2) is constant during the load-transfer.

2. Platform according to patent claim 1, whereby one pump (50, 52) with variable displacement volume is assigned to each load-assuming and load-transferring cylinder set (12, 14).

3. Platform according to patent claim 2, whereby both pumps (50, 52) are variable pumps and have one common motor (54).

4. Platform according to one of the aforesaid patent claims, whereby one motor of the pumps (50, 52) is an electrical motor.

5. Platform according to one of the aforesaid patent claims, whereby each pump (50, 52) of the pump set is arranged by a number of single pumps being connected in parallel.

6. Platform according to one of the aforesaid patent claims, whereby each cylinder set (12, 14) has one or several cylinders.

7. Platform according to one of the aforesaid patent claims, whereby the interlocking device (36, 38) has a lock bolt on the cylinder side (40, 42), which is releasably engageable in interlocking engagement with one of the numerous interlocking mountings (44, 46) at the column (4), which are located one after another in lifting direction.

8. Platform according to patent claim 7, whereby the lock bolt (40, 42) of the load-assuming hydraulic cylinder set (12, 14) is pre-stressed before the interlocking engagement.

9. Platform according to patent claim 7 or 8, whereby the lock bolt is a twistlock (40, 42), which engages in a recess (44, 46) of the column (4).

10. Platform according to one of the aforesaid patent claims, with a sensor for detecting the interlocking engagement.

11. Platform according to one of the aforesaid patent claims, whereby the valve device has pressure relief valves (68, 70; 92, 94) controllable with the control unit for limiting the pressure in the relevant pressure chambers.

12. Platform according to one of the aforesaid patent claims, whereby the cylinder sets (12, 14) are strained with tension over the platform (2).

13. Method for controlling an offshore platform with numerous columns (4), which are lowered for lifting the platform (2) from sea level with a hydraulic lifting device (8), whereby the lifting device (8) has at least two hydraulic cylinder sets (12, 14) for each column (4), whose pressure chambers (28, 34; 30, 36)

can be connected by a valve device (60, 62; 84, 86) to a pump set (50, 52) or drain pipe (64, 66; 88, 90) and on the one hand are held at the platform (2) and on the other hand are connected detachable on the other side by an interlocking device (37, 38) to the column (4) and to a control unit, by which the cylinders (12, 14) are controlled in the way that during a relative movement between platform (2) and column (4) a load-transferring cylinder set (12, 14) is locked with the column (4) by the interlocking device (37, 38), while the other, load-assuming cylinder set (14) is unlocked and pulled back to starting position, in order to be locked with column (4) for load assumption, **being characterised that** by the control unit the pressure agent volume flow to the load-assuming cylinders (12, 14) is for a short while increased during the load-assumption as compared to the pressure agent volume flow, which corresponds to the projected moving speed of platform (2), and the pressure agent volume flow to the load-transferring cylinders (12, 14) is accordingly reduced, and that after the load-assumption the pressure agent flows are reset to a pressure agent flow, which corresponds to the projected moving speed of platform (2).

14. Method according to patent claim 13, whereby the increase of the pressure agent flow of the load-assuming cylinders (12, 14) and the decrease of the pressure agent flow of the load-transferring cylinders (12, 14) takes place in the way that the hydraulic output and/or the speed of the platform (2) remains constant.

15. Method according to patent claim 13 or 14, whereby the increase is set to a period, which amounts to approx. 5 to 20% of the length of the lifting interval, preferably around 20 seconds at a lifting interval of 180 to 240 seconds.

16. Method according to one of the patent claims 13 to 15, whereby the load-transferring cylinders (12, 14) are unlocked, when the load acting on them has fallen below a predefined limit.