

1 Modular Well Tubular Handling System and Method of Use

2

3 The present invention relates to systems and methods of lifting, lowering and/or handling
4 tubular members in a well, and in particular to but not limited to a system for lifting,
5 lowering and/or handling tubulars during running in, pulling out, drilling, milling, workover,
6 completion and/or decommissioning operations.

7

8 Background to the invention

9

10 During well drilling and workover operations, tubular lifting, lowering and handling is
11 required to install, raise, lower and/or remove tubulars in or from a well. During well drilling,
12 as a drill bit extends deeper into the well, further sections of drill pipe are attached to the
13 drill string.

14

15 During the lifespan of the well, workover operations may be required to revitalise ageing
16 wells to bring them back online to extend production. In workover operations, tools and
17 equipment are inserted into a well to perform downhole tasks. The workover operations
18 include running tubular, wireline, slickline, cutting tools, cementing operations, pumping
19 equipment, and various fishing and re-entry services. Typically tools and equipment are
20 run in and pulled out of the well using a workover jacking unit.

21

22 Wells which are no longer used are decommissioned to be made safe. During
23 decommissioning operations, large diameter pipes are slowly removed from the well
24 before the well is sealed. Conventionally, this is performed by a jacking unit with grippers
25 which attach to a pipe and slowly pull the pipe out of the well.

26

27 Conventional tubular member handling systems are specific for each individual operation
28 or task. This may present problems as there are space limitations associated with platform
29 rigs and may create complex planning operations.

30

31 Conventional systems also lack flexibility to deal with changing operational requirements
32 driven by the age of the rig, well or platform. These may cause different offshore
33 infrastructure conditions such as; downgraded crane capacity, reduced skid beam loading
34 capacity, available rig footprint, unknown well status and/or changing well conditions and
35 of drilling/ operational requirements. This may result in significant rig down time whilst

1 suitable individual equipment packages for each operational phase can be obtained and
2 installed on the rig to adapt to a different operation phase or specific well or rig condition.
3 This may also result in increased costs to mobilize large heavy units to deal with all well-
4 related uncertainties.

5

6 Summary of the invention

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8 It is an object of at least one aspect of the present invention to obviate or at least mitigate
9 the foregoing disadvantages of prior art tubular lifting and handling systems.

10

11 It is another object of an aspect of the present invention to provide a modular wellbore
12 tubular lifting system with improved productivity and/or efficiency which may be capable of
13 reliably performing a range of tubular member lifting and handling tasks over a wide range
14 of operations.

15

16 It is an object of an aspect of the present invention to provide a modular wellbore tubular
17 lifting system which is compact, mobile and transfigurable to adapt to a wide range of well
18 operations and conditions.

19

20 It is another object of an aspect of the present invention to provide a lifting system for a
21 modular wellbore tubular lifting system which may be capable of reliably performing a
22 range of lifting tasks over a wide range of operations.

23

24 A further object of at least one aspect of the present invention is to provide a lifting system
25 that is capable of improving the performance of a modular rig system in which the lifting
26 system is deployed.

27

28 It is another object of an aspect of the present invention to provide a robust, reliable,
29 sturdy lifting system suitable for deployment in a wide range of well operations which is
30 capable of rapid tripping speeds and continuous rotary function.

31

32 It is a further object of an aspect of the present invention to provide a system with at least
33 two lifting systems which may provide a multi-redundant lifting or hoisting system.

34

1 It is an object of an aspect of the present invention to provide a system capable of
2 controlling the transfer of hydraulic fluid between one module and at least another module
3 to divert, recycle and/or reuse hydraulic fluid, pressure and/or power.

4
5 It is another object of an aspect of the present invention to provide a system capable of
6 controlling the transfer of hydraulic fluid between one lifting system and another lifting
7 system to divert, recycle and/or reuse hydraulic fluid, pressure and/or power and/or adjust
8 the available hoisting load capacity.

9
10 Further aims and objects of the invention will become apparent from reading the following
11 description.

12
13 According to a first aspect of the invention, there is provided a modular system for lifting
14 and/or lowering a tubular in wellbore operations, the system comprising:
15 at least one module, wherein the at least one module is configured to be removably
16 connected to at least one other module to form an integrated structure substantially above
17 a wellbore.

18
19 The at least one module may comprise a frame. The frame of the at least one module may
20 be configured to be removably connected to the at least one other module to form an
21 integrated structure above a wellbore. The at least one module may be at least one
22 functional module. The at least one module may be prefabricated. The at least one module
23 may be ready for assembly into an integrated structure on a rig, platform, floor and/or
24 deck. The rig, platform, floor and/or deck may be offshore or onshore. The modular system
25 may be suitable for application to a wide range of types and sizes of rig, platform, floor
26 and/or deck. The integrated structure may be assembled on site. The well may be a
27 hydrocarbon well, a geothermal well or a carbon capture storage well. The modular system
28 may be a modular rig system or part of a rig system. The at least one module may be
29 configured to be transported and/or stored separately. The at least one module may be
30 conveniently transported to a rig, platform and/or vessel deck. The system may be
31 removably secured to a rig, platform and/or deck of a vessel. The integrated structure may
32 be assembled offsite and mounted above the wellbore as a single unit. The frame of the at
33 least one module may be a load-bearing structure. The integrated structure may be a load-
34 bearing structure. Any loads acting on the at least one module may be distributed through
35 a base support, the frame and/or integrated structure. Any loads acting on the at least

1 one module may be directly transferred to a base support, the frame and/or integrated
2 structure. The at least one module may be further divided into one or more sub-modules.
3 The one or more sub-modules may be configured to operate independently from one
4 another.

5
6 The system may comprise two or more modules. The two or more modules may be
7 functional modules. The system may comprise a plurality of modules. Each module may
8 comprise a frame. The frames of the two or more modules may be assembled together to
9 form the integrated structure. At least one modules may be assembled in a first
10 configuration to perform one or more tasks in a first wellbore operation. At least one
11 module may be assembled in a second configuration to perform one or more tasks in a
12 second wellbore operation. Two or more modules may be re-configured and/or re-
13 assembled together in a different arrangement depending on the wellbore operation. At
14 least one module may be added and/or removed to perform a wellbore operation or part of
15 a wellbore operation, depending on the wellbore operation. The modular system may be
16 transfigurable or reconfigurable. The system may be transfigurable or reconfigurable
17 between a first wellbore operation mode in which the at least one module in the system is
18 arranged in a first configuration and a second wellbore operation mode in which the at
19 least one module of the system is arranged in a second configuration. The position of the
20 at least one module in the integrated structure may be interchangeable with at least one
21 other module in the integrated structure. The modules may be interconnectable. The
22 control and/or communication connections of each function module may be through
23 standardised interfaces.

24
25 The two or more modules may be arranged in series. The two or more modules may be
26 arranged in series surrounding or partially surrounding a wellbore. The integrated structure
27 may comprise a plurality of modules arranged in a stacked arrangement. The stacked
28 arrangement may be a horizontal stacked arrangement. The stacked arrangement may be
29 a vertical stacked arrangement. The two or more modules may be arranged in an abutting
30 vertically stacked relationship. At least one module may be arranged in an abutting
31 horizontally side-by-side arrangement. The two or more modules may be arranged in a
32 combination of a vertical stack with at least one module branching off in a horizontally
33 side-by-side arrangement. The two or more modules may be mounted or connected in a
34 vertical and/or horizontal offset arrangement. The tubular may be selected from the group
35 comprising: pipe, drill pipe, drill collars, conductor; reamers, shouldered pipe, risers,

1 production pipe, composite pipe, well casing, utility line, wireline, slickline, coiled tubing
2 and/or work over equipment.

3

4 The system may comprise two or more modules. The two or more modules may be
5 configured to operate independently from one another. The two or more modules to move
6 and/or operate sequentially, synchronised, alternating, overlapping and/or staggered.

7 The wellbore operation may be selected from the group comprising installation of: pipe,
8 drill pipe, drill collars, reamers, shouldered pipe, risers, production pipe, composite pipe,
9 well casing, utility line, wireline, slickline and/or work over equipment. The wellbore
10 operation may be selected from the group comprising removal of: pipe, drill pipe, drill
11 collars, reamers, shouldered pipe, risers, production pipe, composite pipe, well casing,
12 utility line, wireline, slickline and/or work over equipment. The wellbore operation may be a
13 running in, pulling out, drilling, milling, workover, completion and/or decommissioning
14 operation.

15

16 The at least one module may be selected from the group comprising; lifting module, crane
17 module, jib crane module, iron roughneck, platforms, platform walkway, pipe deck, stairs,
18 stair tower, transverse substructure, trip tank, jacking frame, fingerboard, service
19 container, catwalk, slip assembly, top drive assembly, elevator assembly, lubricator
20 system, mast; support mast; monkey arm, racker, radial racker, BOP module, base frame,
21 diamond cutter, skidding system, BOP substructure, driller cabin, motor control centre
22 sub-structure, bell nipple frame, pipe handling module and/or tubular storage module. The
23 system may comprise bridge and/or automation packages. The at least one platform may
24 be an open or closed platform. The size and/or height of installation of the at least one
25 platform may depend on the operation. The at least one platform may be a telescopic or
26 extendable platform, The at least one platform may comprise a telescopic or extendable
27 section at the front enabling access to the moving platform.

28

29 The at least one module may comprise at least one lifting module. The at least one lifting
30 module may comprise at least one lifting mechanism. Each lifting module may comprise
31 two or more lifting mechanisms. The at least one lifting module may comprise a movable
32 platform. The movable platform may be configured to move in a substantially vertical
33 direction by the at least one lifting mechanism. The movable platform may be a moving
34 table, a moving platform and/or a load beam. The at least one lifting module may comprise
35 a stationary member. The at least one lifting mechanism may be mounted between the

1 movable platform and the stationary member. The stationary member may be a stationary
2 platform. The at least one lifting mechanism may be configured to move the movable
3 platform vertically relative to the position of the stationary member. The at least one lifting
4 mechanism may be configured to move the movable platform up and/or down vertically
5 towards and/or away from the stationary member. The movable platform may comprise at
6 least one tubular gripper apparatus. The movable platform may comprise a slip assembly.
7 The slip assembly may be configured to selectively grip at least one tubular. The slip
8 assembly may be configured to selectively grip at least one section of a tubular string. The
9 movable platform may comprise a top drive assembly.

10

11 The at least one lifting module may comprise at least one iron roughneck. The at least one
12 iron roughneck may be configured to selectively and/or sequentially grip at least one
13 connection joint of a tubular member. The at least one iron roughneck may be configured
14 to make up or break joint between a tubular member and a tubular string. The iron
15 roughneck may be positioned on the movable platform. The iron roughneck may be
16 positioned on a stationary platform. The iron roughneck may be positioned above the slip
17 assembly. The iron roughneck may be configured to move parallel to one of the lifting
18 system. The iron roughneck may comprise at least one jaw member. The at least one jaw
19 member may be configured to grip a tubular member. The at least one jaw member may
20 be configured to grip at least a section of a tubular member. The at least one lifting module
21 may be configured to sequentially grip, lift and release a tubular member. The at least one
22 lifting module may be a lower or base module. The at least one lifting module may be
23 mounted on or to a lower or base module. The at least one lifting module may be an upper
24 module.

25

26 The at least one lifting mechanism may be selected from the group comprising a jack
27 system, screw jack, hydraulic cylinder, pulley system, rack and pinion system, linear motor
28 or any other lifting device. The at least one lifting mechanism may be configured to pull a
29 tubular member out of the well or push a tubular member into a well. The lifting
30 mechanism may be configured to pull a section of a tubular out of the well or push a
31 section of a tubular into a well. The lifting mechanism may be configured to pull a tubular
32 out of the well or push a tubular into a well. The lifting mechanism may be a dual action
33 mechanism. The lifting mechanism may be configured to provide a lifting or pulling force in
34 a first mode. The lifting mechanism may be configured to provide a lowering or pushing
35 force in a second mode. The lifting mechanism may be configured to provide a lifting or
36 pulling force in a substantially upward or uphole direction in a first mode. The lifting

1 mechanism may be configured to provide a lowering or pushing force in a substantially
2 downward or downhole direction in a second mode. The at least one module may
3 comprise at least one pipe handling module. The pipe handling module may comprise an
4 elevator or gripper. The pipe handling module may comprise a crane system. The at least
5 one pipe handling module may comprise at least one component of pipe lifting equipment.
6 The at least one component of pipe lifting equipment is configured to lift a pipe section
7 accommodated on a rack of a pipe storage module.

8
9 The system may comprise two or more lifting modules. The two or more lifting modules
10 may be configured to move and/or actuate independently. The two or more lifting modules
11 may be configured to move and/or actuate sequentially, synchronised, alternating,
12 overlapping and/or staggered. The two or more lifting modules may be a dual action
13 mechanism. The two or more lifting modules may be a dual action mechanism adding the
14 full capacity of both lifting systems regarding speed and load. The two or more lifting
15 modules may be hydraulically connected with each other to re-use working fluids from one
16 lifting system to the other. The two or more lifting modules may be configured to transfer
17 lifting and/or lowering of a tubular between the two or more lifting modules. The two or
18 more lifting modules may be configured to handover a tubular between the modules. In a
19 tubular lifting configuration, a first lifting module may be configured to lift a tubular a first
20 distance. A second lifting module may be configured to lift the tubular a second distance.
21 In a tubular lowering configuration, a second lifting module may be configured to lower a
22 tubular a first distance. A first lifting module may be configured to lower the tubular a
23 second distance. The system may be configured for continuously and/or automatic
24 tripping. The first lifting module and second lifting module may be configured to handover a
25 tubular between the first lifting module and second lifting modules. The first lifting module
26 and second lifting module may be configured to transfer a load between the first lifting
27 module and second lifting modules. The first lifting module may be configured to transfer a
28 load acting the first lifting module directly to a support or base structure. The second lifting
29 module may be configured to transfer a load acting the second lifting module directly to a
30 support or base structure. This may mitigate loads acting the on the second lifting module
31 being transfer through the first lifting module to the base structure.

32
33 The second lifting module may comprise a top drive assembly and/or an elevator system.
34 The first lifting module may be a lower lifting module. The second lifting module may be an
35 upper lifting module. Each of the two or more lifting modules may be configured to

1 sequentially grip, lift, and release a tubular member. The first lifting module may be a lower
2 or base module. The first lifting module may be mounted on or to a lower or base module.
3 The second lifting module may be an upper module.

4

5 The system may comprise two or more lifting mechanisms. The two or more lifting
6 mechanisms may be configured to move and/or actuate independently. The two or more
7 lifting mechanisms may be configured to move and/or actuate sequentially, synchronised,
8 alternating, overlapping and/or staggered. The two or more lifting mechanisms may be a
9 dual action mechanism. The two or more lifting mechanisms may be a dual action
10 mechanism adding the full capacity of both lifting systems regarding speed and load. The
11 two or more lifting mechanisms may be hydraulically connected with each other to re-use
12 working fluids from one lifting system to the other. The two or more lifting mechanisms
13 may be configured to transfer lifting and/or lowering of a tubular between the two or more
14 lifting mechanisms. The two or more lifting mechanisms may be configured to handover a
15 tubular between the mechanisms. In a tubular lifting configuration, a first lifting mechanism
16 may be configured to lift a tubular a first distance. A second lifting mechanism may be
17 configured to lift the tubular a second distance. In a tubular lowering configuration, a
18 second lifting mechanism may be configured to lower a tubular a first distance. A first lifting
19 mechanism may be configured to lower the tubular a second distance. The system may be
20 configured for continuously and/or automatic tripping. The first lifting mechanism and
21 second lifting mechanism may be configured to handover a tubular between the first lifting
22 mechanism and second lifting mechanism. The first lifting mechanism and second lifting
23 mechanism may be configured to transfer a load between the first lifting mechanism and
24 second lifting mechanism. The first lifting mechanism may be configured to transfer a load
25 acting the first lifting mechanism directly to a support or base structure. The second lifting
26 mechanism may be configured to transfer a load acting the second lifting mechanism
27 directly to a support or base structure. This may mitigate loads acting the on the second
28 lifting mechanism being transferred through the first lifting mechanism to the base
29 structure. The first lifting mechanism may be a lower lifting mechanism. The first lifting
30 mechanism may be a lower or base module. The second lifting mechanism may be an
31 upper lifting mechanism. Each of the two or more lifting mechanism may be configured to
32 sequentially grip, lift, and release a tubular member. The first lifting mechanism may be
33 mounted on or to a lower or base module. The second lifting mechanism may be an upper
34 module. The first lifting mechanism and the second lifting mechanism may be located in or
35 on the same lifting module.

1 The system may comprise a control system. The control system may be configured to
2 control the positioning and/or actuation of the at least one module of the system. The
3 control system may be configured to control the positioning and/or actuation of at least one
4 component of the at least one module of the system. The control system may be
5 configured to control the positioning and/or actuation of at least one a lifting mechanism,
6 iron roughneck, slip assembly, top drive assembly, crane system, elevator assembly,
7 lubricator handling system, monkey arm and/or pipe handling apparatus.

8
9 The control system may be configured to control the position and/or actuation of a first
10 lifting module and/or a second lifting module. The control system may be configured to
11 control a sequential, synchronised, alternating, overlapping and/or staggered movement or
12 actuation of the first lifting module and second lifting module relative to one another.
13 The two or more lifting modules may be arranged in a stacked configuration with one lifting
14 module located above another lifting module. The stacked two or more lifting modules may
15 facilitate continuous well bore operations. The stacked two or more lifting modules may
16 facilitate continuous tripping, drilling and/or milling operations. The control system may be
17 configured to control a sequential, synchronised, alternating, overlapping and/or staggered
18 movement or actuation of the first lifting mechanism and second lifting mechanism relative
19 to one another. The two or more lifting mechanisms may be arranged in a stacked
20 configuration with one lifting mechanism located above another lifting mechanism. The two
21 or more lifting mechanisms may be arranged in one lifting module. The two or more lifting
22 mechanisms may be located in one lifting module arranged in side by side configuration.
23 The two or more lifting mechanisms may facilitate continuous well bore operations. The
24 two or more lifting mechanisms may facilitate continuous tripping, drilling and/or milling
25 operations. The storage module may comprise one or more racks for accommodating a
26 plurality of tubular member sections. Each of the modules may comprise a rig component.
27 The at least one module may be connected or interconnected together to form a modular
28 system with the functionality of a rig. The modular system may be an offshore or onshore
29 modular rig.

30
31 According to a second aspect of the invention, there is provided a well comprising a
32 modular system according to the first aspect of the invention installed around and/or above
33 the well.

34

1 Embodiments of the second aspect of the invention may include one or more features of
2 the first aspect of the invention or its embodiments, or vice versa.

3

4 According to a third aspect of the invention, there is provided a modular wellbore tubular
5 lifting system, the system comprising:

6 two or more functional modules;

7 wherein each functional module has a frame;

8 wherein the frames of the two or more functional modules are configured to be removably
9 connectable to one another to form an integrated structure.

10

11 The frame of the at least one functional module may be load-bearing. The integrated
12 structure when it is assembled may be configured to distribute loads acting on a frame of
13 the at least one the functional module.

14

15 Embodiments of the third aspect of the invention may include one or more features of any
16 of the first or second aspects of the invention or their embodiments, or vice versa.

17

18 According to a fourth aspect of the invention, there is provided a modular system for
19 movement of tubulars into or from a well; the system comprising:

20 at least one module configured to be assembled into one or more configurations;

21 wherein the system is configured to be transfigurable between a first well operation mode

22 wherein one or more modules is arranged in a first configuration;

23 and a second well operation mode wherein one or more module is arranged in a second
24 configuration.

25

26 The one or more modules may be arranged in a first stacked or ordered configuration in
27 first well operation mode. The one or more modules may be arranged in a second stacked
28 or ordered configuration in second well operation mode. The stack or order of the one or
29 more modules may be different in the first and second well operation modes. At least one
30 or more modules may be different in the first and second well operation modes. The well
31 operation may be a hydrocarbon well operation, a geothermal well operation or a carbon
32 capture storage well operation. The at least one module may be selected from the group
33 comprising lifting module; crane module; BOP module; pipe handling module and/or
34 tubular storage module.

35

1 Embodiments of the fourth aspect of the invention may include one or more features of
2 any of the first to third aspects of the invention or their embodiments, or vice versa.

3
4 According to a fifth aspect of the invention, there is provided a method of installing modular
5 wellbore tubular lifting system above a well, method comprising:
6 providing a modular wellbore tubular lifting system; the system comprising
7 at least one module configured to be assembled into one or more configurations;
8 assembling the at least a one module into a first configuration to form an integrated
9 structure.

10
11 The system may comprise two or more modules. The method may comprise arranging the
12 two or more modules in a stacked arrangement to form an integrated structure. The
13 integrated structure may comprise a load-bearing frame. The method may comprise re-
14 arranging at least one module into a second configuration. The method may comprise re-
15 arranging the two or more modules in a form of an integrated structure in a second
16 stacked arrangement. The method may comprise removably attaching or removably
17 mounting the at least one modules to one another to form an integrated structure. The at
18 least one module to may be connected to one another by pins, manually actuated pins,
19 hydraulically actuated pins, welds, bolts, clips, latches and/or flanges pins. The at least
20 one module may be manually and/or hydraulically operated

21
22 The system may comprise at least one lifting module. The at least one lifting module may
23 comprise at least one lifting mechanism. The system may comprise two or more lifting
24 modules. The method may comprise arranging a first lifting module above a second lifting
25 module. The method may comprise stacking the first lifting module above the second lifting
26 module. The method may comprise arranging a second lifting module above a first lifting
27 module. The method may comprise stacking the second lifting module above the first lifting
28 module. The method may comprise positioning, locating, coupling and/or stacking the at
29 least one lifting modules parallel, side by side and/or next to each other. The method may
30 comprise positioning, locating, coupling and/or stacking the at least one modules on top of
31 one another. The method may comprise positioning, locating, coupling and/or stacking the
32 at least one modules parallel, side by side and/or next to each other.

33
34 Embodiments of the fifth aspect of the invention may include one or more features of any
35 of the first to fourth aspects of the invention or their embodiments, or vice versa.

1 According to a sixth aspect of the invention, there is provided a method of reconfiguring a
2 modular wellbore tubular lifting system, the method comprising:
3 providing a modular wellbore tubular lifting system; the system comprising:
4 at least one module assembled in an integrated structure in a first configuration above a
5 well;
6 removing or adding at least one module and/or repositioning the at least one module in the
7 integrated structure to form a second configuration above the well.

8
9 The method may comprise removably attaching and/or removably mounting the at least
10 one modules to one another to form an integrated structure. The at least one module may
11 be connected to one another by pins, manually actuated pins, hydraulically actuated pins,
12 welds, clips, latches, bolts and/or flanges pins. The system may comprise two or more
13 modules. The method may comprise removably attaching and/or removably mounting the
14 two or more modules in a stacked arrangement to form an integrated structure. The
15 method may comprise re-arranging a stacked arrangement of at least a first module into
16 the second configuration. The method may comprise re-arranging two or more modules in
17 a first stacked configuration to form a second stacked configuration. The system may
18 comprise at least one lifting module. The at least one lifting module may comprise at least
19 one sub-module. Each sub-module may comprise at least one lifting mechanism. The
20 system may comprise two or more lifting modules. The method may comprise arranging a
21 first lifting module above a second lifting module. The method may comprise stacking a
22 first lifting module above a second lifting module. The method may comprise assembling
23 and/or reconfiguring the arrangement of at least one module in a second arrangement for
24 a second well operation. The method may comprise adding, removing and/or repositioning
25 at least one module in the second arrangement. When not in use, at least one or more
26 modules may be put into storage to optimise the use of space on the rig, floor, deck and/or
27 platform. The method may comprise assembling and/or reconfiguring the arrangement of
28 at least one module in a third arrangement for a third well operation. The method may
29 comprise adding, removing and/or repositioning at least one module in the third
30 arrangement. The method may comprise removably mounting a BOP module below at
31 least one lifting module. The method may comprise removably mounting a crane module
32 above at least one lifting module. The method may comprise removably mounting a pipe
33 handling module above the at least one lifting module. The method may comprise
34 removably mounting two or more lifting modules in series above a BOP module. The
35 method may comprise transferring a hoisting load directly to the base structure. This may

1 avoid transferring loads acting on the upper hoisting through the lower hoisting system
2 down to the base structure.

3

4 Embodiments of the sixth aspect of the invention may include one or more features of any
5 of the first to fifth aspects of the invention or their embodiments, or vice versa.

6

7 According to a seventh aspect of the invention, there is provided a method of removing a
8 tubular member from a wellbore, the method comprising:

9 providing a modular wellbore tubular lifting system, the system comprising:

10 at least one function module; wherein at least one module comprises a lifting module

11 comprising a lifting mechanism configured to lift and/or lower a tubular;

12 wherein the at least one module comprises a frame configured to be removably

13 connectable to another module to form an integrated structure;

14 locating the modular wellbore tubular lifting system above a wellbore,

15 connecting a tubular string comprising a plurality of tubular members to the lifting

16 mechanism;

17 lifting the tubular string a first distance out of the wellbore;

18 disconnecting a first tubular member from the tubular string; and

19 moving the first tubular member to a storage position.

20

21 The lifting module may comprise at least a first lifting mechanism and a second lifting

22 mechanism. The method may comprise lifting the tubular member a first distance out of

23 the wellbore using the first lifting mechanism and lifting the tubular member a second

24 distance out of the wellbore using the second lifting mechanism. The system may

25 comprise a second lifting module comprising a lifting mechanism. The method may

26 comprise lifting the tubular member a first distance out of the wellbore using the first lifting

27 module and lifting the tubular member a second distance out of the wellbore using the

28 second lifting module. The method may comprise actuating the first and second lifting

29 modules independently. The method may comprise actuating the first and second lifting

30 mechanisms independently. The method may comprise actuating the first and second

31 lifting modules to sequentially, synchronised or alternatively lift the tubular member. The

32 method may comprise actuating the first and second lifting mechanisms to sequentially,

33 synchronised or alternatively lift the tubular member The method may comprise

34 transferring the lifting of the tubular between the two or more lifting modules and/or

35 between the two or more lifting mechanisms. The ability to transfer lifting between the two

1 or more lifting modules and/or two or more lifting mechanisms may speed up the recovery
2 of the tubular from the well. While one lifting member is lifting the tubular the other lifting
3 member may be repositioning itself to a takeover position to allow a continuous lifting
4 action. The method may comprise actuating a slip assembly to grip the tubular. The
5 method may comprise actuating a first lifting mechanism to lift the movable platform of the
6 first lifting module and gripped tubular string to a first distance or a first height. The method
7 may comprise actuating the first lifting mechanism to lift the movable platform of the first
8 lifting module and gripped tubular string to a tubular grip handover position. The method
9 may comprise actuating the second lifting mechanism to lower a movable platform on the
10 second lifting module or support module to a tubular grip handover position. The movable
11 platform on the second lifting module or lift support module may be a load beam.

12

13 The method may comprise actuating a gripping system on a top drive assembly to grip the
14 tubular. The method may comprise actuating the slip assembly on the movable platform on
15 the first lifting module to release the tubular. The method may comprise actuating the
16 second lifting mechanism to lift the movable platform on the second lifting module or lift
17 support module to pull or lift the tubular string to a second distance or a second height.
18 The method may comprise actuating the first lifting mechanism to reposition the movable
19 platform of the first lifting module. The method may comprise actuating the first lifting
20 mechanism to lower the first lifting module to a tubular break position. The method may
21 comprise moving the at least one iron roughneck assembly into alignment with a
22 connection on the tubular. The method may comprise breaking the connection joint with
23 the iron roughneck assembly. The method may comprise actuating the iron roughneck to
24 break the connection between the tubular and the tubular string. The method may
25 comprise de-actuating the iron roughneck.

26

27 The method may comprise actuating an elevator system to tilt the disconnected tubular
28 member. The method may comprise lowering the disconnected pipe to a laydown area.
29 The method may comprise transporting disconnected tubulars to a buffer zone area. The
30 method may comprise actuating a crane module to pick up and/or transport a bundle of
31 disconnected pipes. The method may comprise moving a disconnected tubular member to
32 a tubular storage area using the pipe handling system. The method may comprise moving
33 a disconnected tubular member to a temporary intermediate buffer and/or storage area.
34 Providing an intermediate buffer and/or area may optimise cycle times. The method may
35 comprise providing a radial racking system and/or vertical storage system. The method

1 may comprise providing a monkey arm connected to the lower hoisting frame. The method
2 may comprise moving a position of a tubular and/or at least one module using a monkey
3 arm. The method may be automated or semi-automated. The method may comprise
4 connecting the top drive to a mud circulation system. The method may comprise actuating
5 the slip assembly. The method may comprise lifting the disconnected tubular member from
6 the tubular string.

7
8 Embodiments of the seventh aspect of the invention may include one or more features of
9 any of the first to sixth aspects of the invention or their embodiments, or vice versa.

10

11 According to an eighth aspect of the invention, there is provided a method of installing a
12 tubular member into a wellbore, the method comprising:

13 providing a modular wellbore tubular lifting system, the system comprising:
14 at least one function module; wherein at least one module comprises a lifting module
15 comprising a lifting mechanism configured to lift and/or lower a tubular;
16 wherein each of the modules comprises a frame configured to be removably connectable
17 to another module to form an integrated structure;
18 locating the modular wellbore tubular lifting system above a wellbore,
19 moving a first tubular member from a storage position into alignment with the wellbore;
20 connecting the first tubular member to the lifting mechanism; and
21 lowering the first tubular member a first distance into the wellbore.

22

23 The method may comprise connecting the first tubular member to a tubular string in the
24 wellbore before the lowering the first tubular member a first distance into the wellbore. The
25 lifting module may comprise at least a first lifting mechanism and a second lifting
26 mechanism. The method may comprise lowering the tubular member a first distance out of
27 the wellbore using the first lifting mechanism and lowering the tubular member a second
28 distance out of the wellbore using the second lifting mechanism. The system may
29 comprise a second lifting module comprising a lifting mechanism. The method may
30 comprise lowering the tubular member a first distance into the wellbore using the first lifting
31 module and lowering the tubular member a second distance into the wellbore using the
32 second lifting module. The method may comprise pushing the tubular into the well. The
33 method may comprise actuating the first and second lifting modules independently. The
34 method may comprise actuating the first and second lifting modules and/or first and
35 second lift mechanisms to sequentially, synchronised or alternatively push or lower the

1 tubular member into the well. The method may comprise transferring the lowering or
2 pushing of the tubular between the two or more lifting modules and/or between the two or
3 more lifting mechanisms. The ability to transfer lowering of the tubular between the two or
4 more lifting modules or lifting mechanisms may speed up the installation or running of the
5 tubular into the well. While one lifting member is lowering the tubular the other lifting
6 member may be repositioning itself to a takeover position to allow a continuous lifting
7 action.

8
9 It will be understood that term "lifting module" refers to a module capable of lifting and/or
10 lowering depending on the direction of movement in which it is actuated. In a lifting
11 operation one or more lifting mechanisms in the lifting module are operated in a generally
12 upward direction to pull or lift. In a lowering operation the one or more lifting mechanism
13 are operated in a generally downward direction to push or lower.

14
15 The method may comprise transporting disconnected tubulars from a buffer zone area.
16 The method may comprise actuating the crane to pick up and/or transport disconnected
17 pipes. The method may comprise moving the disconnected tubular member from a tubular
18 storage area to the elevator system using the pipe handling system. The method may
19 comprise actuating the elevator system to tilt to engage the disconnected tubular member.
20 The method may comprise connecting the elevator system to a disconnected tubular
21 member. The method may comprise actuating a gripping system on a top drive assembly
22 to grip the tubular. The method may comprise lifting the disconnected tubular member and
23 aligning the tubular member with a tubular string. The method may comprise handling
24 and/or transferring a tubular between a storage rack and the rig floor. The method may
25 comprise handling and/or transferring a tubular between a storage rack and the rig floor
26 using a catwalk. The catwalk may comprise a deck and a ramp. The method may
27 comprise loading a tubular onto a deck of the pipe handling catwalk. The method may
28 comprise transferring a tubular from the deck to a ramp. The method may comprise raising
29 one end of the ramp. The method may comprise driving, lifting or pushing the tubular to
30 move it axially along the ramp. The ramp surface may span or partially span a distance
31 between the deck and a top drive apparatus. The method may comprise transferring the
32 tubular from the ramp to a top drive apparatus. The method may comprise moving the
33 tubular to a pick up location where the tubular is accessible for pick up by a top drive
34 apparatus. The method may comprise lowering at one end of a raised ramp. The method
35 may comprise transferring the tubular from a top drive apparatus to the ramp. The method

1 may comprise driving, lifting or pushing the tubular to move it axially along the ramp
2 towards the deck. The method may comprise transferring a tubular from the ramp to the
3 deck. The method may comprise supporting the movement of a tubular from the catwalk to
4 the well centre. The method may comprise supporting the movement of a tubular from the
5 catwalk to the well centre using at least one monkey arm. The at least one monkey arm
6 may be equipped with a roller or gripper system on one end. The method may comprise
7 actuating the first lifting mechanism to reposition the movable platform of the first lifting
8 module. The method may comprise actuating the first lifting mechanism to move the first
9 lifting module to a tubular break position. The method may comprise moving the at least
10 one iron roughneck assembly into alignment with at least one connection on the tubular.
11 The method may comprise making the connection joint with the iron roughneck assembly.
12 The method may comprise actuating the iron roughneck to make the connection between
13 the tubular and the tubular string. The method may comprise de-actuating the iron
14 roughneck. The method may comprise make up and/or breakout of tubulars. The method
15 may comprise actuating a cathead apparatus to make up and/or breakout tubulars. The
16 method may comprise actuating a cutting device to cut a section of tubular. The method
17 may comprise actuating a diamond cutter to cut a section of tubular. The method may
18 comprise replacing an iron roughneck with a diamond cutter and/or a hydraulic cutting
19 clamp. The method may comprise actuating the second lifting mechanism to push or lower
20 the movable platform of the second lifting module or lift support module to push or lower
21 the tubular string to a first distance into the well. The method may comprise actuating the
22 second lifting mechanism to lower the movable platform of the second lifting module or lift
23 support module to a tubular grip handover position. The method may comprise actuating
24 the slip assembly to grip the tubular. The method may comprise actuating the slip
25 assembly to grip the tubular. The method may comprise actuating a first lifting mechanism
26 to lower or push the movable platform of the first lifting module and gripped tubular string a
27 second distance into the well.

28

29 Embodiments of the eighth aspect of the invention may include one or more features of
30 any of the first to seventh aspects of the invention or their embodiments, or vice versa.

31

32 According to a ninth aspect of the invention, there is provided a modular rig system for
33 wellbore operations, the system comprising:

34 two or more modules each module comprising at least one rig system component;

1 wherein the two or more modules are configured to be connected or interconnected
2 together so as to form an integrated structure.

3
4 The modular rig system may be configured to be assembled, positioned and/or installed
5 substantially above and/or adjacent to a wellbore. The two or more modules may
6 comprise a frame. The frames of the two or more modules may be configured to be
7 assembled together to form the integrated structure. The two or more modules may be
8 configured to be assembled and/or arranged into a first configuration to perform one or
9 more tasks in a first wellbore operation. The two or more modules may be configured to be
10 assembled and/or arranged into a second configuration to perform one or more tasks in a
11 second wellbore operation. The two or more modules may be configured to be arranged in
12 a different configurations by adding to or removing at least one module from the integrated
13 structure depending on the wellbore operation. The two or more modules may be
14 configured to be arranged in a vertical and/or horizontal stacked arrangement. The
15 arrangement of the two or more modules in the integrated structure may be configured to
16 transfer any loads acting on the two or more modules through the integrated structure.
17 The arrangement of the two or more modules in the integrated structure may be
18 configured to transfer loads acting on each of the two or more modules directly to a base
19 support structure. The arrangement of the two or more lift mechanisms may be configured
20 to transfer loads acting on each of the two or more modules directly to a base support
21 structure.

22
23 The modular rig system may be selected from the group comprising a tubular handling
24 system, a tubular lifting system, a pipe removal system, a conductor pipe handling system,
25 a drill system, completion system and/or a wireline system. The wellbore operation may be
26 selected from the group comprising running in, pulling out, drilling, milling, workover,
27 and/or decommissioning operation. The two or more modules may be selected from the
28 group comprising lifting module, crane module, iron roughneck, platforms, slip assembly,
29 top drive assembly, elevator assembly, lubricator system, mast; support mast; monkey
30 arm, racker, radial racker, BOP module, catwalk module, base support module, crane
31 module, jib crane, diamond cutter, skidding system, driller cabin, motor control centre, sub-
32 structure, bell nipple frame, pipe handling module and/or tubular storage module.

33
34 The at least one module may comprise at least one lifting module. The at least one lifting
35 module may comprise at least one lifting mechanism selected from the group comprising a

1 jack system, screw jack, hydraulic cylinder, pulley system, rack and pinion system, linear
2 motor or any other lifting device. The modular system may comprise two or more lifting
3 mechanisms. A first lifting mechanism may be configured to lift or lower a tubular a first
4 distance. A second mechanism may be configured to lift or lower a tubular a second
5 distance. The combined first and second distance may be configured to cover a complete
6 length of a drill pipe section. The combined first and second distance may be configured to
7 cover a complete length of an API Range 3 drill pipe. The at least one lifting mechanism
8 may be configured to pull a tubular member out of the well and/or push a tubular member
9 into a well. The two or more lifting modules or two or more lifting mechanism may be
10 configured to move and/or actuate independently. The two or more lifting mechanisms
11 may be configured to transfer lifting and/or lowering of a tubular between the two or more
12 lifting mechanisms. The two or more lifting mechanisms may be hydraulically connected
13 and configured to transfer hydraulic fluids between the two or more lifting mechanisms.
14 The at least one lifting module may be integrated into or mounted to a base module. The
15 at least one lifting mechanism may be integrated into or mounted in or to a base module.
16 The at least one module may comprise sub-modules. The at least one lifting mechanism
17 may be a submodule of the at least one lifting module. The position of the at least one
18 module in the integrated structure may be interchangeable with at least one other module
19 in the integrated structure. The modular system may comprise a control system. The
20 control system may be configured to control the positioning and/or actuation of the two or
21 more modules of the system. The control system may be configured to control the
22 positioning and/or actuation of the at least one or lifting mechanisms. The control system
23 may be configured to control the positioning and/or actuation of one or more submodule.
24 The two or more modules and/or two or more lifting mechanisms may be configured for
25 continuously and/or automatic tripping.
26
27 The system may comprise a hydraulic system. The one or more modules may comprise a
28 hydraulic system. The hydraulic system may be connectable to two or more hydraulic
29 devices. The hydraulic system may be configured to control the actuation of the at least
30 one lifting mechanism. The hydraulic system may be connectable to two or more hydraulic
31 cylinders. The hydraulic system may be configured to transfer hydraulic pressure and/ or
32 hydraulic fluid between the two or more lifting mechanisms. The hydraulic system may be
33 configured to transfer hydraulic pressure and/ or hydraulic fluid between the two or more
34 hydraulic devices and/or cylinders. This may facilitate improved control of the actuation of
35 the at least one lifting mechanism, hydraulic devices and/or cylinders. This may facilitate

1 increased hoisting capacity. The hydraulic system may be configured to transfer hydraulic
2 pressure and/or hydraulic fluid between the two or more lifting mechanisms to reuse or
3 recycle hydraulic pressure and/ or hydraulic fluid. The hydraulic system may be configured
4 to transfer hydraulic pressure and/ or hydraulic fluid between the two or more hydraulic
5 devices and/or cylinders to reuse or recycle hydraulic pressure and/ or hydraulic fluid.

6

7 Embodiments of the ninth aspect of the invention may include one or more features of any
8 of the first to eighth aspects of the invention or their embodiments, or vice versa.

9

10 According to a tenth aspect of the invention, there is provided a method of configuring a
11 modular rig system comprising:
12 providing a modular rig system comprising
13 two or more modules wherein each module comprising at least one rig system component;
14 wherein the two or more modules are configured to be connected or interconnected
15 together so as to form an integrated structure;
16 assembling the two or more modules in a first configuration to form an integrated structure
17 to perform a first well operation.

18

19 The method may comprise assembling the two more modules into at least a second
20 configuration to perform at least a second well operation. The first well operation and/or
21 second well operation may be selected from the group comprising a wellbore tubular lifting
22 operation, a drilling operation, a pipe removal operation, a conductor jacking operation
23 and/or a wireline operation. The method may comprise arranging the two or more modules
24 in a stacked or connected arrangement to form an integrated structure. The method may
25 comprise removing, adding and/or repositioning at least one module in the integrated
26 structure to form the second configuration.

27

28 Embodiments of the tenth aspect of the invention may include one or more features of any
29 of the first to eleventh aspects of the invention or their embodiments, or vice versa.

30

31 According to an eleventh aspect of the invention, there is provided a method operating a
32 modular rig system comprising:
33 providing a modular rig system comprising
34 two or more modules each module comprising at least one rig system component;

1 wherein the two or more modules are configured to be connected or interconnected
2 together so as to form an integrated structure;
3 assembling the two or more modules in a first configuration to form an integrated structure;
4 performing a first well operation;
5 reconfiguring the two or more module to form a second configuration; and
6 performing a second well operation.

7
8 The first and/or second well operation may be a tubular handling operation. The system
9 may comprise at least a lifting module comprising a lifting mechanism configured to lift
10 and/or lower a tubular; and actuating the lifting mechanism to lift or lower a tubular section
11 out from or into the wellbore. The first and/or second well operation may be a drilling
12 operation. The system may comprise at least one lifting module and a top drive module.
13 The at least one lifting module may comprise at least one lifting mechanism. The at least
14 one lifting module may comprise two or more lifting mechanisms. The at least one lifting
15 module may comprise two or more lifting mechanisms configured to support the load of the
16 top drive module. The method may comprise moving a top drive module connected to a
17 drill pipe member a first vertical distance using a first lifting mechanism. The method may
18 comprise transferring a load of the top drive module and/or a load of the drill pipe member
19 to a second lifting mechanism. The method may comprise transferring the top drive
20 module to a second lifting mechanism. The method may comprise moving the top drive
21 module a second vertical distance using the second lifting mechanism. The method may
22 comprise releasing the drill pipe member from the top drive module. The method may
23 comprise transferring the top drive module from the second lifting mechanism to the first
24 lifting mechanism. The method may comprise connecting the top drive module to a next
25 drill pipe member. The first and/or second well operation may be a wireline operation. The
26 system may comprise at least a wireline assembly. The system may comprise a crane
27 module. The method may comprise lifting the wireline assembly into position above the
28 wellbore. The method may comprise passing a wireline into the well. The method may
29 comprise conducting the wireline operation. The method may comprise moving the
30 wireline assembly into a handling position. The method may comprise connecting,
31 disconnecting and/or changing a wireline tool. The method may comprise actuating a
32 monkey arm to change the position of the wireline assembly into or out of alignment with
33 well centre.

34

1 Embodiments of the eleventh aspect of the invention may include one or more features of
2 any of the first to tenth aspects of the invention or their embodiments, or vice versa.

3

4 According to a twelfth aspect of the invention, there is provided a method of drilling a well
5 comprising providing the system according to any of the first, second, fourth or ninth aspects
6 of the invention;
7 assembling the system in a desired configuration; and
8 performing a drilling operation.

9

10 Embodiments of the twelfth aspect of the invention may include one or more features of
11 any of the first to eleventh aspects of the invention or their embodiments, or vice versa.

12

13 According to a thirteenth aspect of the invention, there is provided a method of performing
14 a wireline operation comprising providing the system according to any of the first, second,
15 fourth or ninth aspects of the invention;
16 assembling the system in a desired configuration; and
17 performing a wireline operation.

18

19 Embodiments of the thirteenth aspect of the invention may include one or more features of
20 any of the first to twelfth aspects of the invention or their embodiments, or vice versa.

21

22 According to a fourteenth aspect of the invention, there is provided a method of pulling out
23 or running in a tubular comprising providing the system according to any of the first, second,
24 fourth or ninth aspects of the invention;
25 assembling the system in a desired configuration; and
26 performing a pulling out or running in operation.

27

28 Embodiments of the fourteenth aspect of the invention may include one or more features
29 of any of the first to thirteenth aspects of the invention or their embodiments, or vice versa.

30

31 According to a fifteenth aspect of the invention, there is provided a hydraulic system for
32 controlling flow of hydraulic fluid to or between two or more modules of the system
33 according to any of the first, second, fourth or ninth aspects of the invention.

34

35 Embodiments of the fifteenth aspect of the invention may include one or more features of
36 any of the first to fourteenth aspects of the invention or their embodiments, or vice versa.

1 Brief description of the drawings

2

3 There will now be described, by way of example only, various embodiments of the
4 invention with reference to the following drawings (like reference numerals referring to like
5 features) in which:

6

7 Figures 1A and 1B presents a modular tubular lifting and handling system in accordance
8 with an embodiment of the invention, shown in front and perspective views respectively;

9

10 Figure 2A presents a lower lifting module of the pipe handling system of Figure 1A, shown
11 in front view;

12

13 Figure 2B presents an upper lifting module of the pipe handling system of Figure 1A,
14 shown in front view;

15

16 Figure 2C presents a BOP module of the pipe handling system of Figure 1A, shown in
17 front view;

18

19 Figures 3A to 3F presents the modular tubular lifting and handling system of Figure 1A in
20 front views during stages of moving the upper and lower jacks to pull out a tubular from a
21 well, the BOP has been removed for clarity;

22

23 Figure 4 presents a modular tubular lifting and handling system with an elevator system in
24 accordance with an embodiment of the invention, shown in front view;

25

26 Figure 5 presents an optional crane module for use with a modular tubular lifting and
27 handling system such as shown in Figure 1A in accordance with an embodiment of the
28 invention, shown in front view;

29

30 Figure 6 presents a modular tubular lifting and handling system in accordance with another
31 embodiment of the invention, shown in side view;

32

33 Figure 7 presents a modular tubular lifting and handling system for wireline operations in
34 accordance with another embodiment of the invention, shown in front view;

35

1 Figure 8 presents a modular tubular lifting and handling system in a wireline bottom hole
2 assembly change mode operation in accordance with another embodiment of the
3 invention, shown in side view; and

4
5 Figure 9 presents a modular tubular lifting and handling system in accordance with another
6 embodiment of the invention, shown in front view.

7
8 Figures 10A and 10B show a modular tubular lifting and handling system in accordance
9 with an embodiment of the invention, shown in profile and front views respectively;

10
11 Figures 11A to 11D show overhead, profile and front views respectively of a lifting module
12 of the modular tubular lifting and handling system of Figure 10A;

13
14 Figures 12A to 12B show profile and front views of a lifting support module of the modular
15 tubular lifting and handling system of Figure 10A;

16
17 Figures 13A and 13B show a perspective and overhead views of a moving platform of the
18 modular tubular lifting and handling system of Figure 10A;

19
20 Figure 14 shows an enlarged cross sectional view of the hydraulic cylinders and support
21 mast of the modular tubular lifting and handling system of Figure 10A;

22
23 Figures 15A and 15B show perspective views of the load beam and top drive assembly
24 respectively of the modular tubular lifting and handling system of Figure 10A;

25
26 Figures 16A to 16E show front views of modular tubular lifting and handling system during
27 stages of a drilling operation;

28
29 Figures 17A to 17E show front views of a modular tubular lifting and handling system
30 during stages of a tubular removal process operation;

31
32 Figures 18A to 18C show front views of a modular tubular lifting and handling system
33 during stages of a removal of an outer completion tubing;

34

1 Figures 19A to 19C show front and side views of a modular tubular lifting and handling
2 system configured for workover wireline operations during stages of a wireline operation;

3
4 Figure 20 shows a perspective view of a modular rig in accordance with an embodiment of
5 the present invention with optional modules attached;

6
7 Figure 21A to 21D show schematic figures of a valve arrangement in a hydraulic system
8 that may be used to control components of the modular system of Figure 10A during
9 stages of a tubular pull out operation;

10
11 Figure 22A to 22D show schematic figures of a valve arrangement in a hydraulic system
12 that may be used to control components of the modular system of Figure 10A during
13 stages of a tubular run in operation; and

14
15 Figures 23A to 23B show schematic figures of a valve arrangement in a hydraulic system
16 that may be used to control components of the modular system of Figure 10A for
17 increased hoisting capability.

18
19 Detailed description of preferred embodiments

20
21 Figures 1A and 1B show front profile and perspective views respectively, of modular
22 tubular lifting and handling system 10. The system 10 has a frame 20. The system 10
23 comprises a lower lifting module which in this example is described as a lower jacking
24 module 14 (best shown in Figure 2A); an upper lifting module which in this example is
25 described as an upper jacking module 16 (best shown in Figure 2B) and an optional BOP
26 module 18 (best shown in Figure 2C). Figure 1A shows an example setup of modular
27 tubular handling system 10 where the BOP module 18, lower jacking module 14 and upper
28 jacking module 16 are assembled on top of each other. In this example jacking
29 mechanisms are used as the lifting mechanisms and are referred to as jacking modules for
30 clarity.

31
32 The lower jacking module 14 comprises a frame 20b, a static platform 22 and a moving
33 platform 24. The moving platform 24 has a slip assembly 30 and a power tong 31. The
34 power tong is configured for making/ breaking or rotating a connected pipe string. A
35 plurality of hydraulic cylinders 26, four are used in this example, are connected to the static

1 platform 22 and moving platform 24. However, it will be appreciated that more or less than
2 four cylinders 26 may be used. The cylinders 26 when actuated control the lifting or
3 lowering the moving platform 24 relative to the static platform 22. The lower jacking
4 module 14 comprises two hollow telescopic columns 25 (best shown in Figure 1B) which
5 provide structural support and guide the movement of the cylinders 26. Optionally the
6 lower jacking module 14 comprises an intermediate platform 42 with the frame 20b.

7
8 The upper jacking module 16 comprises a frame 20a, a static platform 32 and a moving
9 platform 34. The moving platform 34 has a top drive assembly 40 configured to engage a
10 drill string. A plurality of hydraulic cylinders 36, two are used in this example are connected
11 to the static platform 32 and moving platform 34. However, it will be appreciated that more
12 or less than two hydraulic cylinders 36 may be used. The cylinders 36 when actuated
13 control the lifting or lowering of the moving platform 34 relative to the static platform 32.
14 The upper jacking module 16 comprises two hollow columns 35 (best shown in Figure 1B)
15 which provide structural support and guide the movement of the cylinders 36. The
16 cylinders 36 are connected to the static platform 32 of the upper jacking module 16 and
17 lower static platform 22 allowing mechanical and potentially hydraulically connection of all
18 cylinders of the lower and upper jacking modules. The static platform 32 provides space to
19 work with additional tooling. The static platform 32 optionally has a slot towards the pipe
20 feeding direction for transporting pipe by an elevator system between the well center and
21 intermediate pipe buffer zone.

22
23 Figures 1A and 2C show an optional BOP module 18 for well control operations. The BOP
24 module 18 comprises an adjustable bell nipple 44 with a flow return line 46 and static
25 frame 20c to host at least an annular BOP and well control system 48 with kill line 50 and
26 choke line 52. The static frame 20c optionally has the capacity to distribute the BOP
27 weight down to a skidding structure (not shown) on which the frame 20c is stacked. It will
28 be appreciated that for operations that do not require a BOP such as casing tubular
29 removal or installation the BOP frame may be removed. The BOP weight may be
30 transferred to the well head or through the frame to the platform structure which may be
31 sitting on a skidding substructure for offshore purposes.

32
33 The hydraulic cylinders 26, 36 in this example, have at least an 8m stroke, which is longer
34 than hydraulic cylinders used in conventional jacking systems. The provision of the hollow
35 columns 25, 35 provides structural and guidance to the longer hydraulic cylinders as they

1 move between retracted and extended conditions. By assembling the upper and lower
2 jacking modules so that they extend in opposing directions enables the hydraulic cylinders
3 to support each other for alignment and reduces total assembly height.

4

5 In the lower and upper jacking modules, the hydraulic cylinders 26, 36 are located
6 between the static platforms 22, 32 and the moving platforms 24, 34 respectively illustrating
7 various elevation heights in Figure 1A and 1B. Actuation of the hydraulic cylinders moves
8 the moving platforms 24, 34 in the vertical axis. The static platforms 22, 32 of the upper
9 and lower jacking modules may be equipped with an assembly to hold the weight of the
10 drill string or tubular when pulling out of the hole or run in the hole. The moving platforms
11 24, 34 of the upper and lower jacking modules may be equipped with rotary systems. The
12 moving platform 24 of the lower jacking module may comprise a power tong system
13 configured to make and/or break the tubular. In this example, the moving platform 34 of
14 the upper jacking module is a load beam and may comprise a top drive with an optional
15 elevator system to tilt the tubular from or to the well center allowing for pick up or lowering
16 of the tubular from or to a laydown area.

17

18 The disconnected tubular segments from the tubular string are transported in single
19 tubular segments by a tiltable elevator system from, or to, a buffer zone area, where the
20 tubulars are temporarily located before either the crane picks them up in bundles, or they
21 are stored in a fingerboard system. The top drive assembly 40 may be connected to a
22 swivel for mud circulation through a connected drill string. The modular arrangement of
23 Figure 1A facilitates rapid tripping capacity beyond existing conventional tripping speeds
24 and simplifies current pipe handling operations compared to conventional hydraulic tubular
25 handling and workover units. The columns 25, 35 may provide counter torque support for
26 the top drive. The frames 20a, 20b and 20c of the modules may be designed to be
27 reversibly and/or removably connected and/or mounted to one another. This may allow the
28 different modules to be connected to one another in different configurations.

29

30 Figures 3A to 3F show sequential movement of the modular tubular handling and lifting
31 system of Figure 1A during the stages of pulling out a tubular 90 from a well; the BOP has
32 been removed for clarity. Figure 3A shows the hydraulic cylinders 26 connected to the
33 moving platform 24 and the static platform 22 of the lower jacking module in a partially
34 retracted position. The slip assembly 30 on the lower jacking module is actuated to grip an
35 upper end of the drill string 90. The hydraulic cylinders 36 are connected to the moving

platform 34 and the static platform 32 of the upper jacking module 16 and connected to the base structure of the hollow cylinders sitting on the lower structure 22. The upper jacking module 16 is in a partially extended position where the moving platform (load beam) 34 is located at a mid-stroke length of the hydraulic cylinders.

Figure 3B shows the moving platform 24 of the lower jacking module and the moving platform (load beam) 34 of the upper jacking module approaching a handover position. The hydraulic cylinders 26 are actuated to a partially extended condition as shown in Figure 3B. The moving platform 24 is moved in a substantially vertical upward direction as shown as arrow "A" in Figure 3B. As the moving platform 24 of the lower jacking module is moved to partially extended condition the tubular 90 is pulled out of the well. The hydraulic cylinders 36 are actuated to a partially retracted condition to move the moving platform (load beam) 34 of the upper jacking module to approach a handover position as shown in Figure 3B. The moving platform 34 is moved in a substantially vertical downward direction as shown as arrow B in Figure 3B.

Figure 3C shows the moving platform 24 of the lower jacking module and the moving platform (load beam) 34 of the upper jacking module at a handover position. The hydraulic cylinders 26 are actuated to a fully extended condition as shown in Figure 3C. The moving platform 24 is moved in a substantially vertical upward direction as shown as arrow "C" in Figure 3C. As the moving platform 24 of the lower jacking module is moved to fully extended condition the tubular 90 is pulled out of the well to a first distance, which in this example is at least the half the length of a single tubular member length. The hydraulic cylinders 36 are actuated to a fully retracted condition to move the moving platform 34 of the upper jacking module to the handover position as shown in Figure 3C. The moving platform 34 is moved in a substantially vertical downward direction as shown as arrow "D" in Figure 3C. In the fully retracted condition, the moving platform 34 of the upper jacking module is brought in close proximity to the moving platform 24 of the lower jacking module. The top drive assembly 40 on the moving platform 34 of the upper jacking module is actuated to grip the tubular and the slip joint assembly 30 on the lower jacking module is actuated to release the tubular. In this example, the minimum stroke of each of the hydraulic cylinders 26, 36 of the lower jacking module and upper jacking module is at least 8m. For continuous tripping, there is an overlap of 1m over which handover can take place. This may increase the stroke length of 1m for each jacking module. In this example, the minimum stroke of each of the lower jacking module and upper jacking

1 module is at least 8m. For continuous tripping, there is an overlap of 1m over which
2 handover can take place. This may increase the stroke length of 1m for each jacking
3 module .

4

5 As shown in Figure 3D, after handover, the hydraulic cylinders 36 are actuated to a fully
6 extended condition to move the moving platform 34 of the upper jacking module. The
7 moving platform 34 is moved in a substantially vertical upward direction as shown as arrow
8 "E" in Figure 3D. In the fully extended condition, the moving platform 34 of the upper
9 jacking module is brought to upper end of the frame (not shown) and pulls the tubular 90
10 out of the well exposing a connection joint 92 of the tubular. As shown in Figure 3E, the
11 hydraulic cylinders 26 are actuated to a fully retracted condition to move the moving
12 platform 24 of the lower jacking module in a substantial vertical downward direction as
13 shown as arrow "F" in Figure 2E. As shown in Figure 2E the lower jacking module is
14 brought into close proximity with the connection joint 92 of the tubular. The power tongs 31
15 on the lower jacking module engages the connection joint and breaks the joint to allow the
16 upper tubular section to be removed from the tubular string 90. The disconnected pipe
17 section is moved to a storage area optional by an elevator system and/or a crane system
18 (not shown) or any other pipe handling system such as pipe racker unit. As shown in
19 Figure 3F, with the pipe section 91 removed the hydraulic cylinders 26 and 36 are
20 actuated to move the moving platform 34 of the upper jacking module and the moving
21 platform 24 of the lower jacking module back to a starting position ready to engage and
22 pull another section of the tubular from the well. Although the above example in Figure 3A
23 to 3F describes the operation of the system to pull a tubular from a well, it will be
24 appreciated that the operation may be reversed or partially reversed to run in a tubular,
25 into the well. It will also be appreciated that the movement of the moving platforms 24 and
26 34 and components of the upper and lower lifting modules may be sequential,
27 synchronised, alternating, overlapping and/or staggered.

28

29 The operation of two moving platforms of the lifting modules in opposite vertical directions
30 facilitates sequential gripping and pushing and/or pulling of the tubular. While the lower
31 lifting module grips and pulls the tubular a first distance out of the well the upper lifting
32 module is repositioned to a handover position to take over gripping the tubular before the
33 slip assembly holding the drill string in the lower lifting module is opened to release the
34 lower lifting module from the drill string. While the upper lifting module takes over gripping
35 the drill string and pulls and/or pushes the drill string a second distance out of the well, the

1 lower lifting module is repositioned to a disconnect position to engage the connection point
2 on the drill string and breaks and/or makes the pipe. This system may mitigate waiting time
3 of the top drive once the maximum hoisting length is reached and in return may increase
4 the tripping speed and may facilitate a continuous tripping operation. Optionally, a rotary
5 system may be provided on both moving platforms 24 and 34. The rotary system may be
6 used for drilling, milling, making and/or breaking operations. Optionally the rotary system
7 may be positioned off-centre. Optionally the rotary system removed or moved temporarily
8 from the well centre.

9
10 For continuous tripping mode the top drive assembly may be moved out of the well centre
11 to facilitate a pipe racker to pick up the disconnected tubular section, while the remaining
12 tubular string is gripped and pulled by the slip assembly on the moving platform of the
13 lower lifting module. Once the tubular is removed out of well centre, the top drive assembly
14 may be moved back to its original position to pick up the string again from the approaching
15 lower platform of the lower lifting module to pull it up at its full stroke. During a drilling
16 operation, the drill string may be connected to the top drive assembly allowing mud to
17 circulate through the borehole. Alternatively, or additionally, the tubular may be only
18 rotated through a rotary system on the lower lifting module.

19
20 Although the examples above describes the lower lifting system as breaking and/or
21 making the tubular string, it will be appreciated that the lower lifting module and/or the
22 upper lifting module system may have the capability to rotate or break and/or make the
23 tubular string while the system is operating.

24
25 Figure 4 schematically shows features of tubular handling system 100 in accordance with
26 an embodiment of the invention. The tubular handling system 100 is similar to the system
27 10 described in Figure 1A and will be understood from the description of Figure 1A.
28 However, the system 100 described in Figure 4 includes a tilting elevator system 160.
29 The system 100 has an intermediate buffer zone 162 such as a slide 164 attached to the
30 intermediate platform 142, or such as a mousehole in vertical position. The elevator
31 system 160 is able to tilt to facilitate the lowering or pick-up of pipe sections at the
32 intermediate buffer zone 162, which may comprise a basket, slide or fingerboard. The
33 correct height of the intermediate platform allows a safe handover of pipe lengths 27 to 30
34 ft long (API Range 2 pipes) to or from the elevator 160. Longer pipes of 38 to 45 ft lengths
35 (such as API Range 3 pipes) are handled from the static platform 132 of the upper jacking

1 module 116. The slide 164 has a slot 166 in an upper slide section 168 dimensioned to
2 allow a pipe section to pass through the upper section of the slide.

3

4 Figure 5 shows an optional crane module system 200 comprising a frame 20d. In this
5 example the frame 20d is configured to be removably or reversibly mounted above the
6 frame 20a of the upper lifting system. However, as the modules are interconnectable the
7 crane module may be connectable to other module types. As an example, Figure 9 below
8 describes a crane module attached to frame 20b of the lower lifting system. Figure 5
9 shows the crane module 200 comprises a bridge crane 270 travelling on rails 272. The
10 crane system may be equipped with a winch or pipe gripper system to assist the
11 transportation of the pipes. In this example the crane system has pipe gripper module 274.
12 The pipe gripper module comprises grippers 275 configured to grip and move sections of
13 pipe. The crane system may alternatively or additionally be configured to assist in the
14 transportation of tubulars and wireline equipment. The crane system 200 may enhance the
15 tripping sequence in automated mode without any manual handling involved.

16

17 Figure 6 schematically shows features of modular tubular lifting and handling system 300
18 in accordance with an embodiment of the invention. The tubular lifting and handling system
19 300 is similar to the system 10 described in Figure 1A and will be understood from the
20 description of Figure 1A. However, the system 300 described in Figure 6 includes a titling
21 elevator system 160 as described and understood from Figure 4 and the crane system 200
22 as described and understood from Figure 5 above. The system 300 comprises an optional
23 removable pipe storage system 377 for storage of pipe sections. The grippers 275 of the
24 pipe gripper module 274 are configured to pick up pipes to or from a vertical modular rack
25 in the pipe storage system 377. In a pull-out operation, once the box is full, it can be
26 disconnected and replaced by a new box enabling a continuous tripping sequence
27 independently of the racking capacity. This may also reduce the total amount of required
28 lifts. The removable pipe storage system 377 may be connected to the frame 20. The
29 crane module system 200 is reversibly or removably mounted on top of the upper lifting
30 module. The pipe gripper module 274 comprises pipe grippers 275 which moves with the
31 moving platform 34 while the rotary system breaks and/or makes the tubular connection.
32 Once the tubular is disconnected from or connected to the string and handed over to the
33 gripper 274 the upper rotary system can be positioned to the well center to allow full
34 rotation of the string towards the modular pipe storage system 377. Additionally, or
35 alternatively, the pipe gripper module 274 may have the capacity to move horizontally in

1 both directions and in vertical directions. The system 300 also comprises an optional stair
2 tower 379 for easy access to static platforms. Each moving platform may be equipped with
3 a rotary system comprising at least one rotary drive for drilling, milling, making, and
4 breaking operations.

5
6 The arrangement of the upper lifting module, lower lifting module, crane module and tilting
7 elevator module may speed up the tripping speed and reduce overall manual labor
8 handling in transporting the pipes to a laydown area, or to a dedicated racking system. The
9 optional removable pipe box 377 of the racking system may be removed once full or
10 emptied to support an uninterrupted tripping or drilling operation, reducing the overall
11 number of total lifts and total crane occupation. Equipped with a tiltable elevator system on
12 a top drive assembly in combination with tubular storage may reduce the crane occupation
13 and manual pipe handling compared to conventional rig-less solutions. A rotary system is
14 connected to the moving platform of the lower lifting module to facilitate rotation of the
15 tubular/pipe at high speeds and/or high torque while performing an operation such as
16 tripping, drilling and/or milling. The rotary system may also be used to make and break the
17 tubular. A slip assembly is connected to a bearing system to support the rotation of the
18 string. The top drive may be removed automatically from the well center as shown in
19 Figure 6, while the pipe is located in the slip assembly in the moving platform of the lower
20 lifting module. By moving the top drive from the well center, the tubular/pipe may be
21 rotated and lifted above the height of the top drive. The sequential actuation of the upper
22 lifting module, lower lifting module, and ability to lift the tubular/pipe past the top drive
23 enables and/or simplifies continuous tripping. The system 300 may allow automated or
24 semi-automated mode. The system 300 in combination with an automated racking system
25 or semi-automated racking system may allow refilling or emptying the setback area in
26 assistance with a crane during operations. The presence of the multi direction vertical
27 racker system may allow continuous tripping mode. The removable pipe racking system,
28 the stair tower to access all static platform levels, and the rotary system which has the
29 additional mechanism to rotate the pipe body at high-speed rates for continuous drilling
30 mode are all optional modules.

31
32 Figure 7 shows an alternative modular tubular lifting and handling system 400. The
33 modular tubular lifting and handling system 400 is similar to the system 10 described in
34 Figure 1A and will be understood from the description of Figure 1A. However, the system
35 400 described in the example shown in Figure 7 is configured for workover wireline

1 operations. In a wireline operation setup shown in Figure 7, the upper lifting module is
2 removed and the crane 470 does not comprise a pipe handler module. The system 400
3 has a lubricator 480, a lubricator support frame 482 and two intermediate platforms 427
4 and 442, of which one is not required for short lubricator length. The system has a wireline
5 BOP module 484 mounted on the moving platform 424 of the lower lifting module 414. The
6 system also has a setback area 486 for a wireline tool bottom hole assembly (BHA) to be
7 exchanged. In wireline operation setup shown in Figure 7 the cylinders 426 are configured
8 to extend and lift the moving platform 424 holding the wireline BOP gate system to the
9 same height as the static intermediate platform 427 with a V-door to access the BHA lay
10 down area. The lubricator 480 hangs down on a hook from bridge crane 471 of the crane
11 system 470. However, this setup is also possible with the moving platform at the static
12 platform height of the lower module 22. At the lower level, the wireline BOP 484 is
13 connected to a support frame integrated to the moving platform 424. The overhead crane
14 system 470 is used to lower the lubricator 480 to the laydown area or to support a BHA
15 change.

16
17 Figure 8 shows a modular tubular handling system 500 in a wireline bottom hole assembly
18 change mode operation setup in accordance with another embodiment of the invention.
19 The modular tubular handling system 500 is similar to the system 400 described in Figure
20 7 and will be understood from the description of Figure 7. However, Figure 8 shows the
21 lubricator support frame 582 in tilt mode. A lubricator support frame 582 has a mechanism
22 588 to push up the lubricator 580 from the wireline BOP 584 and to tilt the assembly
23 towards the laydown area in front of the BOP for simpler wireline BHA change.

24
25 Figure 9 shows a modular tubular handling system 600 in a conductor handling operation
26 setup in accordance with another embodiment of the invention. The modular tubular
27 handling system 600 is similar to the system 400 described in Figure 7 and will be
28 understood from the description of Figure 7. However, Figure 9 shows the system
29 comprises a crane module 670 mounted on a lower lifting module 614. It is also
30 understood that this setup may also function without the upper crane module 670.
31 The lower lifting module 614 comprise a frame 20b a static platform 622 and a moving
32 platform 624. In Figure 9 the moving platform is shown in a fully retracted condition. A
33 plurality of hydraulic cylinders 626, four are shown in this example, which are connected to
34 the static platform 622 and moving platform 624. However, it will be appreciated that more
35 or less than four cylinders 626 may be used. The cylinders 626 when actuated control the

1 lifting or lowering the moving platform 624 relative to the static platform 622. The movable
2 platform is configured to grip a conductor. Actuation of the hydraulic cylinders 626 to move
3 the moving platform to an extended position, lifts and pulls the conductor in a substantially
4 upward direction to remove or partially remove the conductor from the wellbore in assistant
5 with a slip system sitting in the moving table 24 and below in the static frame 622. The
6 conductor is cut, and the cut conductor sections transported by the crane module from the
7 wellbore to a basket or slide. Optionally a pipe gripper system similar to the system
8 described in relation to Figure 5 may be used in the crane module.

9
10 Figures 10A and 10B show profile and front views of modular tubular lifting and handling
11 system 700 respectively. The system 700 has a base frame 721. The system 700
12 comprises a lifting module (best shown in Figures 11A to 11C); an upper support module
13 which in this example is an upper mast module 716 (best shown in Figures 12A to 12C)
14 with an optional top drive. The arrangement of Figure 10A differs from the arrangement of
15 Figure 1A in that only one lifting module is used in which the upper and lower hoisting
16 cylinders are integrated to the lower lifting module 714.

17
18 Figure 10A shows an example setup of modular tubular handling system 700 where the
19 lower lifting module is mounted on the base frame 721 and the upper support module 716
20 is mounted on the lower lifting module. In this example jacking mechanisms or hydraulic
21 cylinders are used as the lifting mechanisms in the lower lifting module. Alternatively, or
22 additionally different lifting mechanisms may be used. The lifting module 714 comprises a
23 frame 720b, a static platform 722, a moving platform 724 and a support mast 780.
24 The moving platform 724 as best shown in Figures 13A and 13B is supported by four
25 hydraulic cylinders 726. The four cylinders 726 are connected between the static platform
26 722 and the moving platform 724. It will be appreciated that more or fewer than four
27 hydraulic cylinders may be used. The cylinders 726 when actuated control the lifting or
28 lowering of the moving platform 724 relative to the static platform 722. The lifting module
29 714 also comprises two hydraulic cylinders 736 configured to lift and lower a top drive
30 assembly on a second moving platform 734 movable mounted on the upper support
31 module. In this example the second moving platform is a load beam. The cylinders 736
32 when actuated control the lifting or lowering of the load beam relative to the static platform
33 722. In this example the cylinder housings are facing upwards and only the piston side is
34 connected to the lower static platform 722.

35

1 In this example the hydraulic cylinders 726 are connected to the moving platform 724 via
2 pinned connections which may allow for horizontal rotation degrees of freedom release on
3 each cylinder. Slip assemblies may allow for horizontal translation movement to release
4 degrees of freedom on each cylinder. Plate springs or a separately mounted guidance
5 system may be used to keep the moving platform centralised. In this example the moving
6 platform comprises a frame 724a and rollers 782 which act as guidance rollers which are
7 configured to move along tracks 784 in the support/guidance mast 780 to prevent
8 horizontal or vertical rotation of the platform relative to the support/guidance mast.

9
10 As best shown in Figure 14 the hydraulic cylinders 726, 736 also may comprise a frame
11 783 and rollers 782a at selected positions along their length which are configured to
12 provide support and act as guidance rollers to move along tracks 784 in the
13 support/guidance mast 780 to prevent horizontal or vertical rotation to of the hydraulic
14 cylinders relative to the guidance mast as the hydraulic cylinders move between extended
15 and retracted conditions. The moving platform 724 may support a slip assembly and a
16 power tong. The power tong may be configured for making/ breaking or rotating a
17 connected pipe string. The upper support module 716 comprises a frame 720a, a moving
18 platform 734 in this example the moving platform is a load beam. The load beam as best
19 seen in Figure 15A has a telescopic function, guided on tracks by a roller guidance
20 assembly and is connectable through a pin connection for free rotation to the two hydraulic
21 cylinders 736 mounted on the lifting module 714. In this example the hydraulic cylinders
22 736 are connected to the load beam 734 via pinned connections which may allow for
23 horizontal rotation degrees of freedom release on each cylinder. Slip assemblies may
24 allow for horizontal translation movement to release degrees of freedom on each cylinder.
25 In this example the load beam comprises rollers 792 which act as guidance rollers which
26 are configured to move along tracks 784 in the support/guidance mast 780 to prevent
27 horizontal or vertical rotation of the platform relative to the support/guidance mast. In this
28 example the load beam 734 comprises lugs 735 its underside to provide connection to the
29 top drive assembly. This may allow a top drive assembly to be connected (or
30 disconnected) for drilling operations.

31
32 In this example, the top drive assembly module 800 comprises a dolly 810 comprises a
33 frame 811 and two bails 812 as shown in Figure 15B. The bails are capable of tilting to the
34 front and rear and potentially able to rotate up to 360 degree movement. The elevator
35 system is configured to tilt out from well centre from the bails. Hooks 814 are provided to

1 connect to lugs on the load beam. The hooks provide the top drive assembly with easy
2 connection/disconnection for drilling operations. In this example the top drive assembly
3 module 800 comprises rollers 816 which act as guidance rollers which are configured to
4 move along tracks 784 in the support/guidance mast 780 to prevent horizontal/vertical
5 rotation and/or translation of the top drive assembly module 800 relative to the guidance
6 mast. In this example, the top drive assembly module 800 comprises feet 818 to allow the
7 top drive assembly to be handed over to the moving table in drilling operations. The
8 frames 720a and 720b of the lower lifting module and upper support module are designed
9 to be reversibly and/or removably connected and mounted to one another. This may allow
10 the different modules to be connected to one another in different configurations.

11

12 Figures 16A to 16E show sequential movement of the modular tubular handling system
13 during the stages of the drilling operation. A first stage is to actuate the hydraulic cylinders
14 726 connected to the moving platform 724 to a retracted position to locate the moving
15 platform 724 to a low position on the lower lifting module and actuate the hydraulic
16 cylinders 736 connected to the load beam 734 to an extended position to locate the load
17 beam and attached top drive to a high position on the upper support module as shown in
18 Figure 16A. In this condition the drilling operation continues through the stroke length of
19 the hydraulic cylinders 736.

20

21 During drilling operation, the top drive assembly is moved in a substantially downward
22 direction as the hydraulic cylinders 736 retract moving drill string 793 in a downward
23 direction into the wellbore. Once the hydraulic cylinders 736 has retracted to a handover
24 position, the support of the top drive assembly is transferred from the upper support
25 module to the lower lifting module as shown in Figure 16B.

26

27 The system comprises sensors which detect the position and/or load on the top drive
28 assembly and moving platform. When the handover procedure is initiated the hydraulic
29 cylinders 726 are actuated to an extended position to locate the moving platform 724 to a
30 handover position on the lower lifting module. In this example positional sensors control
31 the movement of the bails and top drive assembly to move from well centre either front or
32 rear. A load cell located at the load beam acts as a safety release. The load cell measures
33 the loads acting on the load beam and the handover sequence may be initiated if the
34 measured load is below a specific load limit. The hydraulic cylinders 736 are further
35 retracted to move the top drive assembly downwards until the feet of the top drive dolly

1 contact the moving platform 724 and a load cell located at the moving platform is
2 configured to measure if the load has been transferred to the moving platform 724. Once
3 the load cell on the moving platform has confirmed the load transfer, hydraulic pins
4 located in the feet of the dolly system are actuated to lock inside the landing area of the
5 moving platform.

6
7 Both the hydraulic cylinders 726 and hydraulic cylinders 736 move at the same velocity to
8 allow for continuous drilling. If the load cells on the moving platform and the load beam
9 detect a successful load distribution through the moving platform the top drive assembly is
10 disengaged from the load beam. To disengage from the load beam, the hydraulic cylinders
11 736 moves in a downward direction at a faster velocity than the hydraulic cylinders 726,
12 until it reaches a hook unlock position which in this example is approximately 100mm. The
13 top drive dolly hooks are now dis-engaged from the load beam and full control of the top
14 drive assembly support is now transferred to the moving platform 724. As shown in Figure
15 16C once the top drive is released from the load beam the hydraulic cylinders 726 and
16 moving platform 724 support the further downward movement of the top drive assembly.
17 The top drive assembly continues in a downward direction until the hydraulic cylinders 726
18 are in a fully retracted position where a static hydraulic slip located in the base frame 721
19 takes the drill pipe and the top drive assembly is repositioned to accept a new drill pipe
20 section. The hydraulic cylinders 726 are actuated to an extended position to locate the
21 moving platform 724 and supported top drive assembly to the handover position on the
22 lower lifting module. At the handover position the hooks on the top drive assembly engage,
23 the load beam, the hydraulic pins on the dolly feet unlock to the landing area of the moving
24 platform and the load is transferred to the load beam. The hydraulic cylinders 726 and 736
25 are actuated to move the moving platform 724 and load beam to the first stage as shown
26 in Figure 16E.

27
28 Figures 17A to 17E show sequential movement of the modular tubular handling system
29 700 during the stages of the tubular removal process operation. A first stage is to actuate
30 the hydraulic cylinders 726 connected to the moving platform 724 to a retracted position to
31 locate the moving platform 724 to a low position on the lower lifting module where a slip
32 assembly on the moving platform 724 is actuated to grip an upper end of the drill string 90.
33 Hydraulic cylinders 736 connected to the load beam 734 are actuated to an extended
34 position to locate the load beam and attached top drive to a high position on the upper
35 support module as shown in Figure 17A. The hydraulic cylinders 726 are actuated to an

1 extended condition as shown in Figure 17B. The moving platform 724 is moved in a
2 substantially vertical upward direction as shown as arrow "A" in Figure 17B. As the moving
3 platform 724 is raised the tubular 90 is pulled out of the well a first distance as shown in
4 Figure 17B. The hydraulic cylinders 736 are actuated to a retracted condition as shown in
5 Figure 17B to reach a handover position. The top drive assembly 800 is moved in a
6 substantially downward direction as the hydraulic cylinders 736 retract. Once the hydraulic
7 cylinders 736 has retracted to a handover position, elevator clamps on the top drive take
8 hold of the drill pipe.

9
10 The moving platform 724 and top drive assembly both move momentarily in an upward
11 direction as shown in Figure 17C to ensure a safe handover, which is confirmed by load
12 sensors on the moving platform and load beam. The hydraulic slip on the moving platform
13 724 is actuated to release the pipe. The hydraulic cylinders 726 are actuated to a
14 retracted condition as shown in Figure 17D to move the moving platform 724 in a
15 substantially vertical downward direction until it returned to a pipe gripping position as
16 shown in Figure 17D. The hydraulic cylinders 736 are actuated to an extended condition
17 as shown in Figure 17D to move the top drive assembly and connected pipe in a
18 substantially vertical upward direction to pull the pipe out of the well a second distance as
19 shown in Figure 17D. The pipe section is removed as shown in Figure 17E. The above
20 steps are repeated until the tubular is removed from the well. Although the above example
21 in Figure 17A to 17E describes the operation of the system to pull a tubular from a well, it
22 will be appreciated that the operation may be reversed or partially reversed to run in a
23 tubular into the well. It will also be appreciated that the movement of the moving platform
24 724 and load beam 734 and components of the lower lifting module and/or upper support
25 modules may be sequential, synchronised, alternating, overlapping and/or staggered.

26
27 Figures 18A to 18C show sequential movement of the modular tubular handling system
28 1100 during the stages of the removal of the outer completion tubing. The tubular handling
29 system 1100 comprises a lifting module 1014 similar to the lifting module 714 described in
30 Figures 10A to 16 and will be understood from the description of Figures 10A to 16.
31 However, the system 1100 described in Figure 18A to 18C includes a diamond cutter
32 module 1160 instead of a tubular making and breaking system. A first stage is to actuate
33 the hydraulic cylinders 1126 connected to the moving platform 1124 to a retracted position
34 to locate the moving platform 1124 to a low position on the lifting module where a slip

1 assembly on the moving platform 1124 is actuated to grip an upper end of the conductor
2 pipe 1191.

3

4 The hydraulic cylinders 1126 are actuated to an extended condition as shown in Figure
5 18B. The moving platform 1124 is moved in a substantially vertical upward direction as
6 shown as arrow "A" in Figure 18B. As the moving platform 1124 is raised the conductor
7 pipe 1191 is pulled out of the well a first distance as shown in Figure 18B. Hydraulic slips
8 on the lower transverse structure 1121 are actuated to grip the conductor pipe. Hydraulic
9 slips on the moving platform 1124 actuated to release the conductor pipe. The hydraulic
10 cylinders 1126 are actuated to a retracted condition as shown in Figure 18C to move the
11 moving platform 1124 in a substantially vertical downward direction until it returned to a
12 pipe gripping position as shown in Figure 18C. The pipe gripping position being located
13 below the position of the diamond cutter module 1160. The diamond cutter module is
14 actuated to cut the pipe. The section of cut conductor pipe is removed. The process is
15 repeated until the conductor pipe 1191 is removed from the wellbore. This process can be
16 supported by the two modular jib cranes 1131 mounted to the mast structure.

17

18 Figures 19A to 19C show sequential movement of the modular tubular handling system
19 1200 configured for workover wireline operations during the stages of a wireline operation.
20 The modular tubular handling system 1200 is similar to the modular tubular handling
21 system 700 described in Figure 10A and will be understood from the description of Figures
22 10A. However, the system 1200 described in Figure 19A to 19C includes a lubricator
23 module 1280, a lubricator support frame 1281, a wireline BOP module 1284, a monkey
24 arm module 1286, a jib crane module 1288, a closed platform front 1292 and a wireline
25 assembly module 1290. A first stage is the monkey arm module 1286 is actuated to
26 position it rearward of the well centre. The wireline assembly module is lifted into well-
27 centre via the modular jib crane 1131 as shown in Figure 19A. For changing the Bottom
28 Hole Assemblies (BHA) the wireline BOP assembly is disconnected from the lubricator
29 package. The monkey arm is configured to automatically move out the wireline lubricator
30 assembly to an appropriate handling position. The wireline tool is then changed on the
31 wireline assembly and plugged into position as shown in Figure 19C. The wireline
32 assembly is then re-positioned over the well-centre via automatic movement by the
33 monkey arm. The wireline assembly is now able to continue its operations in the well.
34 Once completed the wireline assembly is lifted back to a stored location via the jib crane
35 1131. It may be possible with this system arrangement to carry out maintenance and

1 pressure testing operations whilst in its stored location on the system to mitigate non-
2 productive time. It will be appreciated that the jib crane module may consist of a winch,
3 telescopic boom and/or pulley assembly and can be installed at various heights on the
4 lower or upper module
5

6 Figure 20 schematically shows features of an example tubular handling system 1300 in
7 accordance with an embodiment the present invention. The tubular handling system 1300
8 is similar to the system 700 described in Figures 10A and will be understood from the
9 description of Figures 10A. However, the system 1300 described in Figure 20 includes
10 optional modules attached for various well operations including load beam 1334, top drive
11 assembly 1380, jib crane module 1331, fingerboard 1333, radial racker 1337, monkey arm
12 1335, sub base module 1339, working platform 1341, elevated platform 1343, drillers
13 cabin 1345 and iron roughneck 1347. It will be appreciated that one or more modules may
14 be added or removed. Additional modules may be selected from the group comprising
15 lifting module, crane module, platform walkway, pipe deck, stairs, stair tower, transverse
16 substructure, trip tank, jacking frame, service containers, catwalk, slip assembly, elevator
17 assembly, lubricator system, mast; support mast; BOP module, base frame, diamond
18 cutter, skidding system, BOP substructure, motor control centre, bell nipple frame, pipe
19 handling module and/or tubular storage module. The platform may be an open or closed
20 platform. The size and/or height of installation of the at least one platform may depend on
21 the operation. The platform may be a telescopic or extendable platform, The platform may
22 comprise a telescopic or extendable section at the front enabling access to the moving
23 platform.
24

25 Figure 21A to 21D show schematic figures of a valve arrangement in a hydraulic system
26 1400 that may be used to control components of the modular system of Figure 10A during
27 stages of a tubular pull out operation. Figure 21A shows the status of the hydraulic system
28 1400 which controls the actuation of the four hydraulic cylinders 726 which control the
29 movement of the moving platform (not shown) and the actuation of the two hydraulic
30 cylinders 736 which control the movement of the load beam 734. In the figures arrows "A"
31 shown the direction of movement of the four hydraulic cylinders 726 and moving platform.
32 Arrows "B" shown the direction of movement of the two hydraulic cylinders 736 and load
33 beam. The other arrows in the Figures show the flow of hydraulic fluid through the valve
34 arrangement of the hydraulic system.
35

1 In this example the four cylinders are shown for clarity as two outer cylinders 726a and two
2 inner cylinders 726b it will be appreciated that the cylinders arrangement may be different.
3 In Figure 21A two hydraulic cylinders 736 are in an extended condition to locate the load
4 beam 734 at its upper position. The four hydraulic cylinders 726 are in a retracted
5 condition to locate the moving platform 724 at its lowest position with the pipe to be
6 removed from the well gripped by the hydraulic slip assembly. Figure 21A shows the
7 upper cylinders 736 are in a differential acting mode where valves V1 and V2 are open
8 between upper cylinder volume 736 and inner lower cylinder volume 726b.

9
10 Valves V3 and V4 between the lower cylinders 726 and the hydraulic storage tank 1420
11 are closed. Valves V5, V6 and V7 between the outer lower cylinders 726a and the
12 hydraulic pump 1410 are opened. The pumped hydraulic fluid in the lower outer cylinders
13 726a move the cylinders to an extended condition. Valves V9 and V10 between the upper
14 cylinders 736 and outer lower cylinder 726a are closed. Valves V1 and V2 between the
15 upper cylinders 736 and inner lower cylinders 726b is opened and the hydraulic fluid
16 passes from the upper cylinders 736 to the inner lower cylinders 726b. The load beam 734
17 and top drive assembly (not shown) move in a generally downward direction shown by
18 arrow "B" towards the handover position with the retraction of the upper cylinders 736.
19 The moving platform 724 and attached pipe are moved in a generally upward direction
20 shown by arrow "A" to the handover position with the extension of the lower cylinders 726
21 as shown in Figure 21B.

22
23 At the handover position shown in Figure 21B, the tubular is gripped by the top drive and
24 released by the hydraulic slip assembly on the moving platform. Valves V1, V2 and V11
25 open between the upper cylinders 736 and the pump 1410 which moves the upper
26 cylinders 736 to an extended position as shown in Figure 21C. The load beam 734 and
27 top drive assembly move in a generally upward direction pulling the tubular further out of
28 the well. Valves V6, V7, V12, V13 and V3 between the lower cylinder 726 and the
29 hydraulic storage tank open while valve V5 closes to the hydraulic pumps and the lower
30 cylinder 726 retracts lowering the moving platform. The procedure is repeated to pull
31 further sections of the tubular from the well.

32
33 Figure 22A to 22D show schematic figures of a valve arrangement in a hydraulic system
34 1400 that may be used to control components of the modular system of Figure 10A during
35 stages of a tubular run in operation. The hydraulic system 1400 is similar to the system

1 described in Figures 21A to 22D and will be understood from the description of Figures
2 21A to 22D. Figure 22A shows an initial condition where the two upper cylinders 736 in an
3 extended condition and the load beam 734 is at its upper position with the pipe to be run in
4 gripped by the top drive assembly. The four hydraulic cylinders 726 are in a retracted
5 condition to locate the moving platform 724 at its lowest position. Figure 22B show the
6 upper cylinders 736 are in differential acting mode where valves V1 and V2 are open
7 between upper cylinder volume 736 and inner lower cylinder volume 726b.
8
9 Valves V3 and V4 between the lower cylinders 726 and the hydraulic storage tank are
10 closed. Valves V5, V6 and V7 between the outer lower cylinder 726a and the hydraulic
11 pump 1410 are opened and the pumped hydraulic fluid in the outer lower cylinder 726a
12 actuates the lower cylinder arrangement 726 to an extended condition. Valves V1 and V2
13 between the upper cylinders 736 and inner lower cylinders 726b are opened and the
14 hydraulic fluid passes from the upper cylinders 736 to the inner lower cylinders 726b.
15 Valves V9 and V10 are closed between the upper cylinders 736 and the outer lower
16 cylinders 726a. The upper cylinders 736 moves to a retracted condition lowering the load
17 beam, top drive assembly and attached tubular in a generally downward direction towards
18 a handover position. The moving platform is moved in a generally upward direction shown
19 by arrow "A" in Figure 22B to the handover position with the extension of the lower
20 cylinders 726.
21
22 At the handover position shown in Figure 22B the tubular is gripped by the hydraulic slip
23 assembly on the moving platform and released by the top drive assembly. All Valves V5
24 and V11 between the pump and all cylinders 736 and 726 are closed. Valves V1 and V2
25 between the inner lower cylinders 726b and upper cylinders 736 stay open and hydraulic
26 fluid passes from the inner lower cylinders 726b to upper cylinders 736. The upper
27 cylinders 736 are actuated to an extended position where the load beam and top drive
28 assembly are moved in a generally upward direction shown by arrow "B" in Figure 22C to
29 receive another tubular section. Valve V3 between the outer lower cylinder 726a and the
30 hydraulic storage tank 1420 are opened. The outer lower cylinders 726a are move to a
31 retracted position shown in Figure 22D. The moving platform is moved to a retracted
32 position pushing the tubular into the well. The procedure is repeated to run in further
33 sections of the tubular into the well.
34

1 Figures 23A to 23B show schematic figures of a valve arrangement in a hydraulic system
2 1400 that may be used to control components of the modular system of Figure 10A for
3 increased hoisting capability. Figure 23A and 23B show actuation of the hydraulic system
4 for increased hoisting load capacity. As shown in Figure 23A the upper cylinder 736 is in
5 direct acting mode where the valves V9 and V10 are open between the annular volume of
6 the upper cylinders 736 and hydraulic pumps 1410. Valves V1, V2, V14 and V15 between
7 the piston volume of the upper cylinders 736 with the inner lower cylinders 726b are
8 opened. To further increase the hoisting load capacity the valves are opened between all
9 lower cylinders 726 and the pumps 1410, which pressurized all of them for higher load
10 capacity. Valve V1, V2 and V4 are opened to drain the fluid from the upper cylinders 736
11 to the storage tank 1420.

12

13 It will be appreciated that various valve positions and configurations are possible for other
14 operational sequences such as for drilling operations. The ability of the hydraulic cylinder
15 volumes to be connected and selectively control flow of hydraulic fluid between the
16 hydraulic cylinders may reduce required flow rates from the pump, reduce actuation time
17 and/or increase hoisting load capacity. It will be appreciated that similar a hydraulic system
18 may be used for other hydraulic drive systems such as a hydraulic rack and pinion drive
19 system. The hydraulic connections and valve positions may allow the connection of an
20 upper lifting system with a lower lifting system by switching the flow direction and
21 connecting certain motor groups with each other.

22

23 It will be appreciated that the embodiments described in Figures 1A to 23 may illustrate
24 different arrangements of modules of the system during the different phases of the life of
25 the well. As an example, the system setup described in Figure 7 may be the setup for a
26 first phase to perform one or more wireline operations. Attaching the BOP module and an
27 upper jacking module may allow a smooth continuation to the next phase as shown in
28 Figure 1A for pipe installation and recovery. The setup using only the modular lower lifting
29 module 14 such as shown in Figure 2A, or Figure 9 or the lifting module shown in Figure
30 18B may be used for a last phase to recover casing during a decommissioning phase.

31 Optionally, in a casing jacking system the static platform is equipped with an additional slip
32 assembly, which is not necessary, if both jacking frames are mounted to each other. For
33 drilling operations beyond the maximum cylinder stroke both hydraulic slip assemblies may
34 be required.

35

1 Throughout the specification, unless the context demands otherwise, the terms 'comprise'
2 or 'include', or variations such as 'comprises' or 'comprising', 'includes' or 'including' will be
3 understood to imply the inclusion of a stated integer or group of integers, but not the
4 exclusion of any other integer or group of integers. Furthermore, relative terms such as",
5 "horizontal", "vertical", upward, downward, upper, lower and the like are used herein to
6 indicate directions and locations as they apply to the appended drawings and will not be
7 construed as limiting the invention and features thereof to particular arrangements or
8 orientations. The foregoing description of the invention has been presented for the
9 purposes of illustration and description and is not intended to be exhaustive or to limit the
10 invention to the precise form disclosed. The described embodiments were chosen and
11 described in order to best explain the principles of the invention and its practical
12 application to thereby enable others skilled in the art to best utilise the invention in various
13 embodiments and with various modifications as are suited to the particular use
14 contemplated. Therefore, further modifications or improvements may be incorporated
15 without departing from the scope of the invention as defined by the appended claims.

16

17 The invention provides a modular system for lifting and/or lowering tubulars in wellbore
18 operations. The system comprises at least one module, wherein the at least one module
19 comprises a frame. The frame of at least one module is configured to be removably
20 connected to a frame of at least one other module to form an integrated structure above a
21 wellbore.

22

23 Embodiments of the invention may facilitate movement of a first and second tubular lifting
24 in a simultaneously and/or synchronized manner such that a tubular may be pulled out or
25 run into or out rapidly with minimal interruption. Providing two or more lifting modules may
26 provide a multiple redundancy hoisting system. Embodiments of the invention may provide
27 a modular tubular handling and lifting system which can be readily transported,
28 assembled and/or disassembled. The system comprises multiple individual modular
29 components which are compatible with each other and may be added or removed from the
30 system depending on the requirement of a specific well operation, the phase of the well or
31 a condition of the well or rig. This may provide a system which is transfigurable and
32 dynamic capable of being adapted to add or remove modules depending on the
33 operational requirement with minimal downtime. Embodiments of the invention may
34 facilitate all forces acting on the system to be distributed and transferred to the base of
35 hydraulic cylinders and/or to the base support frame. Embodiments of the invention may

1 facilitate the transfer of hydraulic fluid between one lifting system and another lifting
2 system thereby increasing energy efficiency between the lifting systems. By hydraulically
3 connecting the hydraulic cylinders of the lifting systems for specific operations may allow
4 recycling/ reusing and/or diverting hydraulic power instead of draining the hydraulic fluid to
5 a storage tank.

6

7 Providing a modular system capable of adaptation for different well stage operations may
8 reduce the mobilization and assembly of operation specific equipment and/or increase
9 utilization of available equipment. As an example, after finishing a pulling and/or milling
10 operations the upper jacking module and/or BOP module may be removed to use the
11 lower jacking module as a jacking system to pull the conductor.

12

13 The system may be suitable for a wide range of applications in offshore and/or onshore
14 environments on different rig types and sizes. The system may be compact, mobile and
15 transfigurable to adapt to wide range of well operations and conditions. This may facilitate
16 an upgrade and/or downgrade of the systems operational envelope. Deploying only the
17 necessary modules for each well operation phase may increase available rig footprint,
18 reduce maintenance and reduce equipment and maintenance costs. The unused modules
19 may be utilised on another project site until required reducing costs further.

20

21 A further advantage of the system according to an embodiment of the invention is that by
22 providing two independently moving lifting modules tripping speed during run in or pull out
23 may be increased independent of the stroke length. Providing the lifting modules in a
24 stacked arrangement on top of each other may facilitate continuous tripping, drilling and/or
25 milling operations. Another advantage of the system according to an embodiment of the
26 invention is that it may be configured to run in semi-automated or full-automated mode
27 depending on the operational requirements. This may enable continuous or semi-
28 continuous tubular recovery/tubular installation with minimal manual handling.

29

30 Various modifications to the above described embodiments may be made within the scope
31 of the invention herein intended.

Claims

1. A modular rig system, the system comprising:
two or more modules wherein each module comprises at least one rig system component;
wherein the two or more modules are configured to be connected or interconnected together so as to form an integrated structure.
2. The modular rig system according to claim 1 configured to be assembled, positioned and/or installed substantially above and/or adjacent to a wellbore.
3. The modular rig system according to claims 1 or 2 wherein the two or more modules comprise a frame wherein the frames of the two or more modules are assembled together to form the integrated structure.
4. The modular system according to any preceding claim wherein the two or more modules are configured to be assembled and/or arranged into a first configuration to perform one or more tasks in a first wellbore operation.
5. The modular system according to any preceding claim wherein the two or more modules are configured to be assembled and/or arranged into a second configuration to perform one or more tasks in a second wellbore operation.
6. The modular system according to any preceding claim wherein the two or more modules are configured to be arranged in a different configurations by adding to or removing at least one module from the integrated structure depending on the wellbore operation.
7. The modular system according to any preceding claim wherein the two or more modules are arranged in a vertical and/or horizontal stacked arrangement.
8. The modular rig system according to any preceding claim wherein the arrangement of the two or more modules in the integrated structure are configured to transfer loads acting on each of the two or more modules directly to a base support structure.

9. The modular system according to any preceding claim wherein the modular rig system is selected from the group comprising a tubular handling system, a tubular lifting system, a pipe removal system, a conductor pipe handling system, a drill system and/or a wireline system.
10. The modular system according to any preceding claim wherein the wellbore operation is selected from the group comprising running in, pulling out, drilling, milling, workover, completion and/or decommissioning operation.
11. The modular system according to any preceding claim wherein the two or more modules is selected from the group comprising lifting module, crane module, iron roughneck, platforms, slip assembly, top drive assembly, elevator assembly, lubricator system, mast; support mast; catwalk module, monkey arm, racker, radial racker, BOP module, base support module, lift support module, crane module, jib crane module, diamond cutter, skidding system, driller cabin, motor control centre, sub-structure, bell nipple frame, pipe handling module and/or tubular storage module.
12. The modular system according to claim 11 wherein at least one module comprises at least one lifting module.
13. The modular system according to claim 12 wherein the at least one lifting module comprises at least one lifting mechanism selected from the group comprising a jack system, screw jack, hydraulic cylinder, pulley system, rack and pinion system, linear motor or any other lifting device.
14. The modular system according to any preceding claim comprising two or more lifting mechanisms where a first lifting mechanism is configured to lift or lower a tubular a first distance and a second mechanism is configured to lift and/or lower a tubular a second distance.
15. The modular system according to claim 14 wherein the two or more lifting mechanisms are hydraulically connected and configured to transfer hydraulic fluids between the two or more lifting mechanisms.

16. The modular system according to any preceding claim wherein the two or more modules are configured for continuously and/or automatic tripping.
17. A method of configuring a modular rig system comprising:
providing a modular rig system comprising
two or more modules wherein each module comprising at least one rig system component;
wherein the two or more modules are configured to be connected or interconnected together to form an integrated structure;
assembling the two or more modules in a first configuration to form an integrated structure to perform a first well operation.
18. The method according to claim 17 comprising assembling the two more modules into at least a second configuration to perform at least a second well operation.
19. The method according to claim 17 or 18 wherein the first well operation and/or second well operation is selected from the group comprising a wellbore tubular lifting operation, a drilling operation, a pipe removal operation, a conductor jacking operation, completion operation and/or a wireline operation.
20. The method according to any of claims 17 to 19 comprising arranging the two or more modules in a stacked or connected arrangement to form an integrated structure.
21. The method according to claim comprising removing, adding and/or repositioning at least one module in the integrated structure to form the second configuration.
22. A method of operating a modular rig system comprising:
providing a modular rig system comprising
two or more modules each module comprising at least one rig system component;
wherein the two or more modules are configured to be connected or interconnected together so as to form an integrated structure;
assembling the two or more modules in a first configuration to form an integrated structure;
performing a first well operation;

reconfiguring the two or more module to form a second configuration; and
performing a second well operation.

23. The method according to claim 22 wherein the first or second well operation is a tubular handling operation, wherein system comprises at least one lifting module comprising a lifting mechanism configured to lift and/or lower a tubular; and actuating the lifting mechanism to lift or lower a tubular section out from or into the wellbore.
24. The method according to claim 22 wherein the first or second well operation is a drilling operation, wherein system comprises at least one lifting module and a top drive module;
wherein the at least one lifting module comprising two or more lifting mechanisms configured to support the load of the top drive module;
moving a top drive module connected to a drill pipe member a first vertical distance using a first lifting mechanism;
transferring the load of the top drive module to a second lifting mechanism and moving the top drive module a second vertical distance using the second lifting mechanism.
25. The method according to claim 22 wherein the first or second well operation is a wireline operation, wherein the system comprises at least a wireline assembly and a crane module;
lifting the wireline assembly into position above the wellbore;
passing a wireline into the well; and
conducting the wireline operation.