During conventional dummy runs, a temporary hanger with a painted pipe above it is run into the BOP, typically on jointed tubing. Once the temporary hanger lands within the BOP, the rams are closed on the painted pipe with sufficient pressure to leave marks that indicate their position relative to the landed hanger. The rams are then retracted, and the dummy string is retrieved uphole. Based upon the markings on the painted pipe, proper positioning of the SSTT within the BOP is determined and the spacing of the fluted hanger from the SSTT is accordingly adjusted at the surface to achieve the desired positioning when the SSTT is deployed in the BOP.

Although simplistic, there is at least one severe drawback to conventional dummy run operations. Making up the jointed tubing used in the dummy assembly is very time consuming. Given this, and the fact that some wells are drilled at ocean depths of up to 10,000 feet or deeper, it can take days to complete a single dummy run. At the present time, it is estimated that some floating rigs have a daily cost of upwards of 400,000 USD. Therefore, conventional dummy run operations are very expensive.

In view of the foregoing, there is a need in the art for cost-effective approaches to properly positioning of the subsea test equipment within the BOP.

SUMMARY OF INVENTION

According to a first aspect of the present invention, there is provided an assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising: a tubing string; a SSTT positioned along the string; a first hanger positioned along the string; a sensing joint positioned along the string, the sensing joint comprising at least one sensor to sense a position of at least one BOP ram along the sensing mechanism, the sensing mechanism being positioned along the string to determine placement of the SSTT within a BOP; ~~and a second hanger positioned along the string~~.

~~According to a second aspect of the present invention, there is provided~~ Disclosed herein is a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: positioning a SSTT along a tubular

string; positioning a first hanger along the string; positioning a sensing joint along the string; positioning a second hanger along the string; and determining a desired placement of the SSTT within the BOP.

According to a ~~third~~ second aspect of the present invention, there is provided a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: deploying an assembly ~~within a BOP on a first run-in-trip, the assembly~~ comprising ~~the~~ an SSTT, a first hanger and a ~~sensor~~ sensing mechanism positioned along a tubing string; using the sensing mechanism, detecting a location of at least one BOP ram ~~using the sensor~~ along the sensing mechanism; and determining a desired placement of the SSTT within the BOP based upon the detected location of the at least one BOP ram.

According to ~~the fourth~~ a third aspect of the present invention, there is provided a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising determining the placement of the SSTT within the BOP without the use of a dummy run.

~~According to a fifth aspect of the present invention, there is provided~~ Disclosed herein is an assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising: a tubular string; a SSTT positioned along the string; a hanger positioned along the string; and at least one sensor positioned along the string, the at least one sensor disposed to log a position of at least one BOP ram and a hang off location for the hanger.

~~According to a sixth aspect of the present invention, there is provided~~ Disclosed herein is a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: positioning a SSTT along a tubular string; positioning a hanger along the string; positioning a logging tool along the string; and determining a desired placement of the SSTT within the BOP.

~~According to a seventh aspect of the present invention, there is provided~~ Disclosed herein is a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: deploying an assembly comprising the SSTT and a logging tool; logging a position of at least one BOP ram using the logging tool; and determining a desired placement of the SSTT within the BOP

based upon the logged location of the at least one BOP ram.

~~According to an eight aspect of the present invention, there is provided~~ Disclosed herein is an assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising: a tubular string; a SSTT positioned along the string, the SSTT comprising a sensing joint to sense a position of at least one BOP ram; and a hanger positioned along the string.

~~According to a ninth aspect of the present invention, there is provided~~ Disclosed herein is a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: supporting a SSTT along a tubing string, the SSTT comprising a sensing joint; positioning a hanger along the string; and determining a desired placement of the SSTT within the BOP.

~~According to a tenth aspect of the present invention, there is provided~~ Disclosed herein is a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: deploying an assembly comprising the SSTT and at least one sensor; detecting a location of at least one BOP ram using the sensor; and determining a desired placement of the SSTT within the BOP based upon the detected location of the at least one BOP ram.

According to ~~an eleventh~~ fourth aspect of the present invention, there is provided an assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising: a flexible line; a tubular joint supported by the flexible line, wherein the tubular joint is used to determine placement of the SSTT within the BOP; and a dummy hanger supported beneath the tubular joint.

According to a ~~twelfth~~fifth aspect of the present invention, there is provided a method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising: deploying a flexible line from a surface location; supporting a tubular joint on the line; supporting a dummy hanger below the tubular joint; and determining a desired placement of the SSTT within the BOP.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A and 1B illustrate a dummy run elimination assembly according to an exemplary embodiment of the present invention;

FIGS. 2A and 2B illustrate exploded views of hanger adjustment mechanisms according to exemplary embodiments of the present invention; and

FIGS. 3-5 illustrate various alternative assemblies according to exemplary embodiments of the present invention.

DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Illustrative embodiments and related methodologies of the present invention are described below as they might be employed in an apparatus and method for eliminating dummy runs and/or for reducing the time required to conduct dummy runs. In the interest of clarity, not all features of an actual implementation or methodology are described in this specification. Also, the "exemplary" embodiments described herein refer to examples of the present invention. It will of course be appreciated that in the development of any such

CLAIMS

~~WHAT WE CLAIM IS:~~

1. An assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising:

a tubing string;

a SSTT positioned along the string;

a first hanger positioned along the string;

a sensing joint positioned along the string, the sensing joint comprising at least one sensor to sense a ~~position~~ location of at least one BOP ram along the sensing mechanism, the sensing mechanism being positioned along the string to determine placement of the SSTT within a BOP~~; and~~

~~a second hanger positioned along the string~~.

2. An assembly as defined in claim 1, wherein:

the assembly further comprises a second hanger positioned along the string; and

the sensing mechanism is a sensing joint comprising a sensor module extending along a length of the sensing joint.

~~2~~3. An assembly as defined in claim ~~1~~2, wherein the first hanger is positioned beneath the SSTT, the sensing joint is positioned beneath the first hanger, and the second hanger is positioned beneath the sensing joint.

~~3~~4. An assembly as defined in claim 1, wherein the first hanger is axially adjustable along the string.

~~4~~5. An assembly as defined in claim 3, wherein the first hanger comprises an internally threaded collar threadingly engaged to an externally threaded portion of the string.

~~5~~6. An assembly as defined in claim 3, wherein the first hanger comprises a slip mechanism disposed to engage an exterior surface of the string.

~~6~~7. An assembly as defined in claim 1, wherein the second hanger is a temporary hanger comprising a retraction mechanism.

~~7~~8. An assembly as defined in claim 1, further comprising a mechanism to adjust the first hanger along the string relative to the SSTT.

~~8~~9. An assembly as defined in claim 3, further comprising a CPU disposed to determine the axial position of the first hanger along the string.

10. An assembly as defined in claim 1, wherein the sensing mechanism is a logging tool disposed on the string, the logging tool being disposed to log a position of the at least one BOP ram and a hang off location for the first hanger.

11. An assembly as defined in claim 10, wherein the logging tool is positioned below the first hanger.

12. An assembly as defined in claim 1, wherein the sensing mechanism is a sensing joint forming part of the SSTT.

13. An assembly as defined in claim 12, wherein the first hanger is positioned beneath the SSTT.

~~9. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:~~

~~positioning a SSTT along a tubular string;~~

~~positioning a first hanger along the string;~~

~~positioning a sensing joint along the string;~~

~~positioning a second hanger along the string; and~~

~~determining a desired placement of the SSTT within the BOP.~~

~~10. A method as defined in claim 9, further comprising:~~

~~positioning the first hanger beneath the SSTT;~~

~~positioning the sensing joint beneath the first hanger; and~~

~~positioning the second hanger beneath the sensing joint.~~

~~11. A method as defined in claim 9, wherein determining the placement of the SSTT within the BOP further comprises:~~

~~landing the second hanger adjacent the BOP;~~

~~closing at least one BOP ram adjacent the sensing joint;~~

~~detecting a position of the at least one BOP ram; and~~

~~adjusting a position of the first hanger based on the position of the at least one BOP ram, thereby determining the placement of the SSTT within the BOP.~~

~~12. A method as defined in claim 9, wherein determining the placement of the SSTT within the BOP further comprises:~~

~~detecting a position of at least one BOP ram using the sensing joint; and~~

~~adjusting the first hanger in response to the detected position of the at least one BOP ram, thereby determining the placement of the SSTT within the BOP.~~

~~13. A method as defined in claim 12, further comprising:~~

~~disengaging the second hanger;~~

~~passing the second hanger through a landing mechanism; and~~

~~landing the first hanger on the landing mechanism.~~

14. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:

deploying an assembly ~~within a BOP on a first run in trip, the~~ an assembly comprising ~~the~~ an SSTT, first hanger and a ~~sensor~~ sensing mechanism positioned along a tubing string;

using the sensing mechanism, detecting a location of at least one BOP ram ~~using the sensor~~ along the sensing mechanism; and

determining a desired placement of the SSTT within the BOP based upon the detected location of the at least one BOP ram.

15. A method as defined in claim 14, wherein:

the sending mechanism is a sensing joint comprising a sensor extending along a length of the sensing joint; and deploying the assembly further comprises:

positioning the first hanger beneath the SSTT;

positioning the sensing joint beneath the first hanger; and

positioning the second hanger beneath the sensing joint.

16. A method as defined in claim 15, wherein determining the placement of the SSTT within the BOP further comprises:

landing the second hanger adjacent the BOP;

closing at least one BOP ram adjacent the sensing joint;

detecting a position of the at least one BOP ram; and

adjusting a position of the first hanger based on the position of the at least one BOP ram, thereby determining the placement of the SSTT within the BOP.

17. A method as defined in claim 15, wherein determining the placement of the SSTT within the BOP further comprises:

detecting a position of at least one BOP ram using the sensing joint; and

adjusting the first hanger in response to the detected position of the at least one BOP ram, thereby determining the placement of the SSTT within the BOP.

18. A method as defined in claim 17, further comprising:

disengaging the second hanger;

passing the second hanger through a landing mechanism; and

landing the first hanger on the landing mechanism.

~~15~~19. A method as defined in claim 14, further comprising adjusting the position of a hanger relative to the SSTT based upon the detected location of the at least one BOP ram.

~~16. A method as defined in claim 14, further comprising conducting drillstem tests during the first run-in trip.~~

~~17~~20. A method as defined in claim 14, wherein the method is conducted in a single ~~trip~~ downhole trip.

21. A method as defined in claim 14, wherein:

the sending mechanism is a logging tool; and

deploying the assembly further comprises:

positioning the first hanger beneath the SSTT; and

positioning the logging tool beneath the first hanger.

22. A method as defined in claim 21, wherein determining the placement of the SSTT within the BOP further comprises:

passing the logging tool through the BOP and past a hang off location for the hanger;

logging a position of at least one BOP ram and the hang off location for the hanger; and

adjusting the hanger based on the logged positions, thereby positioning the SSTT within the BOP.

23. A method as defined in claim 21, wherein positioning the SSTT within the BOP further comprises:

detecting a position of at least one BOP ram using the logging tool; and

adjusting the hanger in response to the detected position of the at least one BOP ram, thereby positioning the SSTT within the BOP.

24. A method as defined in claim 14, wherein:

the sensing mechanism is a sensing joint forming part of the SSTT; and

deploying the assembly further comprises positioning the first hanger beneath the SSTT.

25. A method as defined in claim 24, wherein determining the placement of the SSTT within the BOP further comprises:

landing the hanger adjacent the BOP;

activating at least one BOP ram adjacent the sensing joint;

detecting a position of the at least one BOP ram; and

adjusting a position of the hanger along the tubing string based on the position of the at least one BOP ram.

26. A method as defined in claim 24, wherein determining the placement of the SSTT within the BOP further comprises:

detecting a position of at least one BOP ram using the sensing joint; and

adjusting the axial position of the hanger along the tubing string in response to the detected position of the at least one BOP ram.

27. A method as defined in claim 14, further comprising conducting a drillstem test while the SSTT is deployed.

~~18~~ 28. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising determining the placement of the SSTT within the BOP without the use of a dummy run.

~~19~~29. A method as defined in claim ~~18~~28, wherein the determination of the placement of the SSTT is accomplished in a single run-in trip.

~~20~~30. A method as defined in claim ~~18~~28, further comprising:

deploying an assembly within a BOP, the assembly comprising the SSTT and a hanger;

detecting a location of at least one BOP ram; and

determining a desired placement of the SSTT within the BOP based upon the detected location.

~~21~~31. A method as defined in claim ~~20~~30, further comprising adjusting the position of the hanger relative to the SSTT based upon the detected location of the at least one BOP ram.

~~22~~32. A method as defined in claim ~~20~~30, wherein determining the placement of the SSTT within the BOP comprises:

comparing a predicted distance between the hanger and the SSTT to a true distance between the hanger and the SSTT; and

adjusting the position of the hanger relative to the SSTT to match the true distance.

~~23. An assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising:~~

~~a tubular string;~~

~~a SSTT positioned along the string;~~

~~a hanger positioned along the string; and~~

at least one sensor positioned along the string, the at least one sensor disposed to log a position of at least one BOP ram and a hang off location for the hanger.

24. An assembly as defined in claim 23, wherein the at least one sensor comprises a logging tool disposed on the string below the hanger.

25. An assembly as defined in claim 23, wherein the at least one sensor is disposed between the SSTT and the hanger.

26. An assembly as defined in claim 23, wherein the hanger is positioned beneath the SSTT, and the sensor is positioned beneath the hanger.

27. An assembly as defined in claim 23, wherein the hanger is axially adjustable along the string.

28. An assembly as defined in claim 23, further comprising a mechanism to adjust the axial position of the hanger along the string relative to the SSTT.

29. An assembly as defined in claim 28, further comprising a CPU disposed to determine an adjustment of the first hanger along the string.

30. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:

positioning a SSTT along a tubular string;

positioning a hanger along the string;

positioning a logging tool along the string; and

determining a desired placement of the SSTT within the BOP.

31. A method as defined in claim 30, further comprising:

positioning the hanger beneath the SSTT; and

positioning the logging tool beneath the hanger.

32. A method as defined in claim 30, wherein determining the placement of the SSTT within the BOP further comprises:

passing the logging tool through the BOP and past a hang off location for the hanger;

logging a position of at least one BOP ram and the hang off location for the hanger; and

adjusting the hanger based on the logged positions, thereby positioning the SSTT within the BOP.

33. A method as defined in claim 30, wherein positioning the SSTT within the BOP further comprises:

detecting a position of at least one BOP ram using the logging tool; and

adjusting the hanger in response to the detected position of the at least one BOP ram, thereby positioning the SSTT within the BOP.

34. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:

deploying an assembly comprising the SSTT and a logging tool;

logging a position of at least one BOP ram using the logging tool; and

determining a desired placement of the SSTT within the BOP based upon the logged location of the at least one BOP ram.

35. A method as defined in claim 34, further comprising adjusting the relative spacing between the SSTT and a hanger based upon the logged position of the at least one BOP ram.

36. A method as defined in claim 34, further comprising performing at least one drillstem test while the SSTT assembly is deployed.

~~37. A method as defined in claim 34, further comprising logging a position of a hang off location, wherein the determination of the placement of the SSTT is also based upon the logged position of the hang off location.~~

~~38. An assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising:~~

~~a tubular string;~~

~~a SSTT positioned along the string, the SSTT comprising a sensing joint to sense a position of at least one BOP ram; and~~

~~a hanger positioned along the string.~~

~~39. An assembly as defined in claim 38, wherein the hanger is an axially adjustable hanger.~~

~~40. An assembly as defined in claim 38, further comprising a mechanism to adjust the hanger along the string.~~

~~41. An assembly as defined in claim 38, wherein the axially adjustable hanger comprises an internally threaded collar threadingly engaged to an externally threaded portion of the string.~~

~~42. An assembly as defined in claim 39, wherein the axially adjustable hanger comprises a slip mechanism disposed to engage an exterior surface of the string.~~

~~43. An assembly as defined in claim 42, further comprising a CPU disposed to determine the axial position of the hanger along the string.~~

~~44. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:~~

~~supporting a SSTT along a tubing string, the SSTT comprising a sensing joint;~~

positioning a hanger along the string; and

determining a desired placement of the SSTT within the BOP.

45. A method as defined in claim 44, wherein determining the placement of the SSTT within the BOP further comprises:

landing the hanger adjacent the BOP;

activating at least one BOP ram adjacent the sensing joint;

detecting a position of the at least one BOP ram; and

adjusting a position of the hanger along the tubing string based on the position of the at least one BOP ram.

46. A method as defined in claim 44, wherein determining the placement of the SSTT within the BOP further comprises:

detecting a position of at least one BOP ram using the sensing joint; and

adjusting the axial position of the hanger along the tubing string in response to the detected position of the at least one BOP ram.

47. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:

deploying an assembly comprising the SSTT and at least one sensor;

detecting a location of at least one BOP ram using the sensor; and

determining a desired placement of the SSTT within the BOP based upon the detected location of the at least one BOP ram.

48. A method as defined in claim 47, further comprising adjusting the axial position of a hanger along a tubing string based upon the detected location of the at least one BOP ram.

49. A method as defined in claim 47, further comprising conducing at least one drillstem test while the SSTT is deployed.

~~50~~33. An assembly to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the assembly comprising:

a flexible line;

a tubular joint supported by the flexible line, wherein the tubular joint is used to determine placement of the SSTT within the BOP; and

a dummy hanger supported beneath the tubular joint.

~~51~~34. An assembly as defined in claim ~~50~~33, wherein the line is one of a wireline, slickline or sandline.

~~52~~35. An assembly as defined in claim ~~50~~33, wherein the tubular joint is a painted joint.

~~53~~36. An assembly as defined in claim ~~50~~33, wherein the tubular joint comprises a sensor to sense a location of at least one BOP ram.

~~54~~37. A method to determine placement of a subsea test tree ("SSTT") within a blow out preventer ("BOP"), the method comprising:

deploying a flexible line from a surface location;

supporting a tubular joint on the line;

supporting a dummy hanger below the tubular joint; and

determining a desired placement of the SSTT within the BOP.

~~55~~38. A method as defined in claim ~~54~~37, wherein deploying the line further comprises deploying one of a wireline, slickline or sandline in a riser.

~~56~~39. A method as defined in claim ~~54~~37, wherein supporting the tubular joint further comprises positioning a painted joint within a BOP.

~~57~~40. A method as defined in claim ~~54~~37, wherein supporting the tubular joint further comprises positioning a joint comprising a sensor to sense a location of at least one BOP ram.

~~58~~41. A method as defined in claim ~~54~~37, wherein determining the placement of the SSTT within the BOP further comprises:

landing the dummy hanger in on landing mechanism adjacent the BOP;

activating at least one BOP ram;

detecting a position of the at least one activated BOP ram;

retrieving the tubular joint to a surface location; and

adjusting the relative spacing between the SSTT and a fluted hanger based on the position of the at least one activated BOP ram.