rotationally oriented within a latch coupling interconnected in the parent wellbore casing string. The latch assembly typically includes a plurality of spring operated latch keys, each having an anchoring and orienting profile that is received in a latch profile formed internally within the latch coupling. In this manner, when the latch keys of the latch assembly are operatively engaged with the latch profile of the latch coupling, the latch assembly and the equipment associate therewith are axially anchored and circumferentially oriented in the desired direction within the parent wellbore casing string. Importantly, to obtain the proper orientation of the latch assembly, the latch coupling of the parent wellbore casing string must first be positioned in the desired orientation. One way to orient the latch coupling is to rotate the parent wellbore casing string with a drill string using measurement while drilling data. It has been found, however, that rotationally orienting the parent wellbore casing string in this manner can be imprecise and time consuming. Accordingly, a need has arisen for improved systems and methods for orienting a parent wellbore casing string in a wellbore.

SUMMARY

[0005a] According to a first aspect of the present invention, there is provided a system for determining an orientation of a casing string in a wellbore, the system comprising: a latch coupling interconnected in the casing string; a wiper plug received within the latch coupling in a known orientation; a sensor module operably associated with the wiper plug and configured to obtain data relating to the orientation of the casing string; and a communication module operably associated with the sensor module, the communication module configured to transmit information to a surface location, wherein, the information corresponds to the data obtained by the sensor module relating to the orientation of the casing string.

[0005b] According to a second aspect of the present invention, there is provided a system for determining an orientation of a casing string in a wellbore, the system comprising: a latch coupling interconnected in the casing string; a wiper plug received within the latch coupling in a known orientation; a sensor module disposed within the wiper plug, the sensor module including at least one of an accelerometer, a gyroscope and a magnetometer configured to obtain data relating to the orientation of the casing string; a communication module operably associated with the sensor module, the communication module configured to transmit information to a surface location, wherein, the information corresponds to the data obtained by the sensor module relating to the orientation of the casing string; a microcontroller operably associated with the sensor module and the communication module; and a power supply operably associated with the sensor module, the communication module and the microcontroller.

[0005c] According to a third aspect of the present invention, there is provided a method for orientating a casing string in a wellbore, the method comprising: positioning a wipe plug in a known orientation within a latch coupling interconnected in the casing string; sealingly engaging the casing string uphole and downhole of the latch coupling with the wiper plug; obtaining data relating to the orientation of the casing string with a sensor module operably associated with the wiper plug; transmitting orientation information corresponding to the data obtained by the sensor module to a surface location with a communication module operably associated with the sensor module; and orienting the casing string to a desired orientation within the wellbore based upon the orientation information received at the surface location.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] For a more complete understanding of the features and advantages of the present disclosure, reference is now made to the detailed description along with the accompanying figures in which corresponding numerals in the different figures refer to corresponding parts and in which:

[0007] Figure 1 is a schematic illustration of an offshore oil and gas platform installing a casing string in a subterranean wellbore according to an embodiment of the present disclosure;

[0008] Figures 2A-2B are cross sectional views of a system for determining an orientation of a casing string in a wellbore according to an embodiment of the present disclosure during a casing string orientation procedure;

[0009] Figures 3A-3B are cross sectional views of a system for determining an orientation of a casing string in a wellbore according to an embodiment of the present disclosure during a liner hanging procedure;

[0010] Figures 4A-4B are cross sectional views of a system for determining an orientation of a casing string in a wellbore according to an embodiment of the present disclosure prior to a cementing procedure;

[0011] Figures 5A-5B are cross sectional views of a system for determining an orientation of a casing string in a wellbore according to an embodiment of the present disclosure during a cementing procedure;

CLAIMS

1. A system for determining an orientation of a casing string in a wellbore, the system comprising:

a latch coupling interconnected in the casing string;

a wiper plug received within the latch coupling in a known orientation;

a sensor module operably associated with the wiper plug and configured to obtain data relating to the orientation of the casing string; and

a communication module operably associated with the sensor module, the communication module configured to transmit information to a surface location,

wherein, the information corresponds to the data obtained by the sensor module relating to the orientation of the casing string.

2. The system as recited in claim 1 further comprising a window joint interconnected in the casing string in a known orientation relative to the latch coupling.

3. The system as recited in claim 1 or claim 2 wherein the sensor module further comprises at least one of an accelerometer, a gyroscope and a magnetometer.

4. The system as recited in any one of the preceding claims further comprising a microcontroller operably associated with the sensor module and the communication module.

5. The system as recited in any one of the preceding claims further comprising a power supply operably associated with the sensor module and the communication module.

6. The system as recited in any one of the preceding claims wherein the communication module further comprises a pulser configured to transmit pressure pulses to the surface location.

7. A system for determining an orientation of a casing string in a wellbore, the system comprising:

a latch coupling interconnected in the casing string;

a wiper plug received within the latch coupling in a known orientation;

a sensor module disposed within the wiper plug, the sensor module including at least one of an accelerometer, a gyroscope and a magnetometer configured to obtain data relating to the orientation of the casing string;

a communication module operably associated with the sensor module, the communication module configured to transmit information to a surface location, wherein, the information corresponds to the data obtained by the sensor module relating to the orientation of the casing string;

a microcontroller operably associated with the sensor module and the communication module; and

a power supply operably associated with the sensor module, the communication module and the microcontroller.

8. The system as recited in claim 7 further comprising a window joint interconnected in the casing string in a known orientation relative to the latch coupling.

9. The system as recited in claim 7 or claim 8 wherein the sensor module further comprises at least one of a three-axis accelerometer, a three-axis gyroscope and a three-axis magnetometer.

10. The system as recited in any one of claims 7 to 9 wherein the communication module further comprises a pulser configured to transmit pressure pulses to the surface location.

11. The system as recited in any one of claims 7 to 10 wherein the wiper plug sealingly engages the casing string uphole and downhole of the latch coupling.

12. The system as recited in any one of claims 7 to 11 wherein the wiper plug releasably engages the latch coupling.

13. The system as recited in any one of claims 7 to 12 wherein the wiper plug further comprises a drillable wiper plug.

14. A method for orientating a casing string in a wellbore, the method comprising:
positioning a wipe plug in a known orientation within a latch coupling interconnected in the casing string;

sealingly engaging the casing string uphole and downhole of the latch coupling with the wiper plug;

obtaining data relating to the orientation of the casing string with a sensor module operably associated with the wiper plug;

transmitting orientation information corresponding to the data obtained by the sensor module to a surface location with a communication module operably associated with the sensor module; and

orienting the casing string to a desired orientation within the wellbore based upon the orientation information received at the surface location.

15. The method as recited in claim 14 wherein obtaining data relating to the orientation of the casing string further comprises obtaining orientation data with at least one of an accelerometer, a gyroscope and a magnetometer.

16. The method as recited in claim 14 or claim 15 wherein transmitting orientation information corresponding to the data obtained by the sensor module to the surface location with the communication module operably associated with the sensor module further comprises transmitting pressure pulses to the surface location.

17. The method as recited in any one of claims 14 to 16 wherein, after orienting the casing string to the desired orientation within the wellbore based upon the orientation information received at the surface location, destructively removing the wiper plug from the casing string.