Identification of underwater components

This invention relates to a method of obtaining data relating to a component for installation at an underwater facility, a component for installation at an underwater fluid extraction facility, and a method of resetting communications parameters within a communications system between a subsea control module and a surface location.

Identification of components or the obtaining of other data relating to components of an underwater fluid extraction well facility, for example a subsea hydrocarbon extraction well facility, is typically achieved by reading written or engraved labels fixed on the item, which provide a visual indication of the component data. However, such labelling has problems associated with it. For example, when such items are in storage in a surface location, it is often difficult to locate the label, particularly if the item is inside a protected package. Furthermore, when the item is deployed underwater it may be difficult to read such labels in a typically poor visibility environment. This reading may typically be attempted by a remote operated vehicle (ROV) equipped with a camera, or a diver.

An example of such an item which requires labelling is a subsea control module (SCM). In the event of a power failure at the complex for example, it may be necessary to obtain information relating to an unpowered module in order to identify all internal components, in order to be able to set communication parameters.

It is an aim of the present invention to overcome these problems and enable simple identification or other data obtaining of components whether in storage at the surface or deployed at an underwater, poor visibility, location. This aim is achieved by employing a wireless identification tag such as a radio frequency identification (RFID) tag or alternative non-contact, non-battery back-up, tag-type device to contain vital information for the equipment. Such tags may be scanned to identify the item and reveal its detail parameters, regardless of visibility.

RFID is an available technology that permits data to be read from a tag using an interrogator or reader device in a wireless manner using radio frequency

communication, so that contact is not required between the tag and the interrogator. Such tags, known as “passive” tags, do not require a battery, since they use some of the radio frequency energy received from the interrogator during interrogation for power, enabling the data to be transmitted to the interrogator. RFID tags typically comprise an integrated circuit for storing and processing the data, modulating and demodulating an RF signal, and an antenna, typically formed as a printed track.

RFID data tags are relatively low cost and they have a low form factor. Reading of the tag data may be achieved by a commercial interrogator / reader that only needs to be in the proximity of the tag in a storage situation and temporarily held in an arm of a ROV for subsea application or by a diver, the data being stored by the reader and retrieved at the surface.

In accordance with a first aspect of the present invention there is provided a method of obtaining data relating to a component for installation at an underwater facility, comprising the steps of:

a) providing a tag which stores data relating to the component, the tag being operable to wirelessly transmit the data to a reader device;
b) locating the tag at the component;
c) providing a reader device; and
d) interrogating the tag using the reader device, such that the tag is caused to wirelessly transmit the data to the reader device.

In accordance with a second aspect of the present invention there is provided a component for installation at an underwater fluid extraction facility, comprising a tag which stores data relating to the component, the tag being operable to wirelessly transmit the data to a reader device.

In accordance with a third aspect of the present invention, there is provided a method of resetting communications parameters within a communications system between a subsea control module and a surface location, comprising the steps of obtaining data relating to the subsea control module using the method of the first aspect, and resetting the communications parameters based on the data obtained.

The invention will now be described with reference to the accompanying drawing, which schematically shows an embodiment of the present invention.

An embodiment of the invention is schematically shown in Fig. 1. Here, a subsea control module (SCM) 1 is shown, which after installation is located at subsea well tree (not shown) on the seabed. An RFID tag 2 is provided and affixed to the SCM 1. This is a passive tag, and so does not require a battery or other connected power source. The tag stores various data associated with the SCM 1, as described further below. These data may for example be programmed to the tag 2 by means of an RFID programmer (not shown) while at the surface. In this embodiment, the SCM 1 is also provided with an identification label, providing a visual indication of the same or similar data, located on the surface of SCM 1. The label is similar to that used currently, having a typical size of 8 cm x 8 cm. The tag 2 is similarly sized, and located behind the label. This means that during interrogation (see below), if one form of identification fails, the other may be used as back-up, i.e. if the RFID tag 2 fails, then data may still be read from the label. Furthermore, since tag 2 is positioned behind the label, it may be easily found.

The tag 2 may be read by a reader device 4, which as shown is carried by an arm of a remote operated vehicle (ROV) 3. In use, the ROV 3 is used to manoeuvre the reader device 4 sufficiently close to the tag 2 to enable data transmission from the tag 2 to the reader device 4. As is known in the art, once the reader device 4 and tag 2 are sufficiently close, radio frequency energy from the reader device 4 activates the tag 2 and causes it to wirelessly transmit data to the reader device 4. The reader device 4 may be configured to ask for all data, or set to collect certain items of data. The collected data is stored by the reader device 4 and retrieved therefrom when it is returned to the surface.

Typical information that would be stored by the RFID tag for subsea equipment, such as an SCM, includes:

1) serial number
2) electronic equipment addresses
3) software revisions

4) part number
5) date of manufacture / installation
6) service interval / information

A subsea electronics module (SEM) 5 is located within or proximate to the SCM 1, the SEM 5 comprising processing means essential for the functioning of the well, and being in communicative contact with the surface location as is known in the art. In the embodiment shown in Fig. 1, the SEM 5 is communicatively connected, either via hardwires or wireless means e.g. using RF connectivity, to an RFID programmer 6. Programmer 6 is located in a suitable position proximate to tag 2 in order to allow reprogramming of tag 2. In this way, SEM 5 is able to control reprogramming of the tag 2 in-situ, i.e. whilst deployed subsea. This SEM - tag connection is used to record any changes to the SCM software configuration, such as SEM addresses, configuration file checksums etc. In addition, the SEM 5 may update the tag 2 with other operational data of the facility which may be of interest when the SCM 1 is eventually retrieved from the subsea location. Such information may include a number of valve operations performed, the time spent subsea etc.

The present invention provides various advantages, including:

- Easy and practical identification of underwater components and devices and their internal components.
- In the case of devices such as an SCM, the data provided by the RFID tag may allow the resetting of communication parameters, even if the device had stopped working, or if there was a potential conflict of communications parameters with other SCMs. In this case the cost of having to retrieve the device may be avoided.

The above-described embodiments are exemplary only, and other possibilities and alternatives within the scope of the invention will be apparent to those skilled in the art. For example, although an ROV has been shown as being used to manoeuvre the reader device into proximity with the tag, a diver may be used instead. In addition, the tagging of components enables identification, and the obtaining of other data, when said component is at a surface location, for example in storage.

While the present invention has been described with particular reference to an RFID-type tag, other technologies may be used which enable wireless data transfer.

The tags described above are passive, requiring no battery or other power source. However, it is possible to use powered devices. In this case, power may be obtained from, for example, batteries, the well tree power supply, or subsea-located power generation means such as turbines.

Claims

1. A method of obtaining data relating to a component for installation at an underwater facility, comprising the steps of:

a) providing a tag which stores data relating to the component, the tag being operable to wirelessly transmit the data to a reader device;

b) locating the tag at the component;

c) providing a reader device; and

d) interrogating the tag using the reader device, such that the tag is caused to wirelessly transmit the data to the reader device.

2. A method according to claim 1, wherein step d) is performed at a surface location.

3. A method according to claim 1, wherein step d) is performed underwater.

4. A method according to claim 3, wherein step d) comprises using a remote operated vehicle to manoeuvre the reader device sufficiently close to the tag to enable said data transmission.

5. A method according to claim 3, wherein step d) comprises using a diver to manoeuvre the reader device sufficiently close to the tag to enable said data transmission.

6. A component for installation at an underwater fluid extraction facility, comprising a tag which stores data relating to the component, the tag being operable to wirelessly transmit the data to a reader device.

7. A method or component according to any preceding claim, wherein the tag is passive.

8. A method or component according to any preceding claim, wherein the tag comprises a radio frequency identification (RFID) tag.

9. A method or component according to any preceding claim, wherein the component comprises a subsea control module.

10. A method or component according to claim 9, wherein the tag is communicatively connected to a subsea electronics module for receiving information therefrom.

11. A method or component according to claim 10, wherein the information comprises changes to the subsea control module software configuration.

12. A method or component according to claim 10, wherein the information comprises operational data of the facility.

13. A method or component according to any preceding claim, wherein the component further comprises an identification label providing a visual representation of the data.

14. A method or component according to claim 13, wherein the label is located on the surface of the component, and the tag is located behind the label.

15. A method or component according to any preceding claim, wherein the data comprises identification data of the component.

16. A method of resetting communications parameters within a communications system between a subsea control module and a surface location, comprising the steps of obtaining data relating to the subsea control module using the method of any of claims 1 to 5 or 7 to 15, and resetting the communications parameters based on the data obtained.

17. A method substantially as herein described with reference to the accompanying figure.

18. A component substantially as herein described with reference to the accompanying figure.