INTEGRAL SENSOR

BACKGROUND

[0001] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the presently described embodiments. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present embodiments. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

[0002] In order to meet consumer and industrial demand for natural resources, companies often invest significant amounts of time and money in finding and extracting oil, natural gas, and other subterranean resources from the earth. Particularly, once a desired subterranean resource such as oil or natural gas is discovered, drilling and production systems are often employed to access and extract the resource. These systems may be located onshore or offshore depending on the location of a desired resource and can include a variety of pressure-containing components, such as wellheads, casings, Christmas trees, pipes or other conduits, and valves, for routing fluids from a well. Operating characteristics of the system, such as pressure and temperature within one or more of the system components, can be measured with sensors and the system can be controlled based on the measured characteristics.

SUMMARY

[0003] Certain aspects of some embodiments disclosed herein are set forth below. It should be understood that these aspects are presented merely to provide the reader with a brief summary of certain forms the invention might take and that these aspects are not intended to limit the scope of the invention. Indeed, the invention may encompass a variety of aspects that may not be set forth below.

[0003a] According to a first aspect, there is provided a system comprising a sensor installed on a carrier; and a component having a body for receiving a fluid; wherein the carrier is integrated into the component to enable the sensor to detect one or more

characteristics of the fluid, and the carrier is integrated into the component such that the carrier and the component collectively present a fully integral pressure boundary that isolates the sensor from the fluid without a seal connection, wherein the component is an oilfield component and the system includes a welded interface between the carrier and the oilfield component.

[0003b] According to a second aspect, there is provided a system comprising: a pressure-containing vessel; a sensing system including a detector module integrally welded to the pressure-containing vessel and an electronics module for receiving data from the detector module, wherein the detector module is positioned within a bore of the pressure-containing vessel and is integrally welded to the pressure-containing vessel at a first end of the bore; and a cap coupled to the pressure-containing vessel at a second end of the bore opposite the first end, wherein the cap is electrically connected with the detector module and with the electronics module so as to enable signals to be passed between the detector module and the electronics module through the cap.

[0003c] According to a third aspect, there is provided a method comprising: installing a sensor housing into a pressure-containing wall of a component; and integrating the sensor housing into the pressure-containing wall by welding the sensor housing to the pressure-containing wall to form a pressure-containing interface between the sensor housing and the pressure-containing wall, wherein welding the sensor housing to the pressure-containing wall includes welding the sensor housing to a pressure-containing surface of the pressure-containing wall such that the pressure-containing wall and the sensor housing provide a fully integral pressure boundary along the pressure-containing wall across the sensor housing.

[0004] Embodiments of the present disclosure generally relate to integration of sensing devices into pressure-containing components. In some embodiments, sensing devices include one or more sensors installed in carriers that are welded into valves,

CLAIMS

1. A system comprising:

a sensor installed on a carrier; and

a component having a body for receiving a fluid;

wherein the carrier is integrated into the component to enable the sensor to detect one or more characteristics of the fluid, and the carrier is integrated into the component such that the carrier and the component collectively present a fully integral pressure boundary that isolates the sensor from the fluid without a seal connection, wherein the component is an oilfield component and the system includes a welded interface between the carrier and the oilfield component.

2. The system of claim 1, wherein the carrier includes a flange positioned within a recess of the component and welded to the component.

3. The system of claim 1, comprising an electronic module communicatively connected to the sensor and positioned apart from the component.

4. The system of claim 1, wherein the sensor is adhered to the carrier.

5. The system of claim 1, wherein the carrier is positioned within a bore of the component, the system further comprising a glass bead that seals an end of the bore, and wherein the sensor is communicatively connected to an electronic module via pins in the glass bead.

6. The system of claim 5, wherein the pins of the glass bead are communicatively connected to the sensor via a printed circuit board.

7. The system of claim 6, wherein the pins of the glass bead are installed in pin-receiving sockets on the printed circuit board.

8. The system of claim 1, wherein the sensor includes at least one of a temperature sensor or a pressure sensor.

9. The system of claim 1, comprising a housing with one end attached to the carrier and another end sealed by a glass bead that includes pins electrically coupled to the sensor installed in the carrier.

10. The system of claim 1, wherein the component includes a valve.

11. A system comprising:

a pressure-containing vessel;

a sensing system including a detector module integrally welded to the pressure-containing vessel and an electronics module for receiving data from the detector module, wherein the detector module is positioned within a bore of the pressure-containing vessel and is integrally welded to the pressure-containing vessel at a first end of the bore; and

a cap coupled to the pressure-containing vessel at a second end of the bore opposite the first end, wherein the cap is electrically connected with the detector module and with the electronics module so as to enable signals to be passed between the detector module and the electronics module through the cap.

12. The system of claim 11, wherein the detector module includes a pressure sensor and a temperature sensor.

13. The system of claim 11, wherein the detector module includes a sensor, a carrier housing the sensor, and a printed circuit board mounted on the carrier and electrically coupled to the sensor.

14. The system of claim 11, wherein the pressure-containing vessel includes a valve actuator and the detector module is integrally welded into a bonnet of the valve actuator.

15. The system of claim 11, wherein the electronics module is positioned apart from pressure-containing vessel.

16. A method comprising:

installing a sensor housing into a pressure-containing wall of a component; and

integrating the sensor housing into the pressure-containing wall by welding the sensor housing to the pressure-containing wall to form a pressure-containing interface between the sensor housing and the pressure-containing wall, wherein welding the sensor housing to the pressure-containing

wall includes welding the sensor housing to a pressure-containing surface of the pressure-containing wall such that the pressure-containing wall and the sensor housing provide a fully integral pressure boundary along the pressure-containing wall across the sensor housing.

17. The method of claim 16, comprising buttering the pressure-containing wall before welding the sensor housing to the pressure-containing wall to facilitate formation of the pressure-containing interface during welding of the sensor housing to the pressure-containing wall.

18. The method of claim 17, comprising:

installing a detector module having a sensor into the sensor housing; and

connecting the detector module to a remote electronics module to enable communication between the detector module and the remote electronics module.

19. The method of claim 18, comprising:

electrically coupling the detector module to pins through a glass bead; and

sealing a cavity about the detector module with the glass bead.