CLAIMS

1. A system for running a subsea wellhead component from a surface platform, comprising:

   a running tool having an upper end for coupling to a running string lowered from the platform, the running tool adapted to carry and set the component in a subsea wellhead;

   a dynamometer stem having a bidirectional torque and weight sensor and adapted to be coupled inline to a lower end portion of the running string, and further coupled to the running tool, so that the dynamometer stem will measure an applied torque and weight at the running tool and produce a sensor signal in response, the dynamometer stem comprising:

   a tubular body having a first portion and a second recessed portion, the second recessed portion defining a recess for accepting the sensor; and

   a sleeve circumscribing the recessed portion of the tubular body, and sealingly engaged with the tubular body to protect the sensor from the environment outside the sleeve;

   an acoustic transmitter mounted to the dynamometer stem and electrically connected to the torque and weight sensor for receiving the sensor signal from the torque and weight sensor, the acoustic transmitter being configured to transmit an acoustic signal through the running string;

   a receptor stem adapted to be coupled inline to an upper end portion of the running string above sea level;

   an acoustic receiver mounted to the receptor stem for receiving the acoustic signal from the acoustic transmitter;

   a radio frequency (RF) transmitter mounted to the receptor stem and electrically connected to the acoustic receiver for transmitting an RF signal that correlates with the acoustic signal received by the acoustic receiver;

   an RF receiver adapter to be located on the platform for receiving the RF signal from the RF transmitter; and

   a display connected with the RF receiver for displaying the signal in real time to an operator on the platform.

2. The system of claim 1, wherein the bidirectional torque and weight sensor comprises:

   a bidirectional load cell having at least eight strain gauges arranged into two wheatstone bridges;

   two strain gauges bonded to the dynamometer stem parallel to a dynamometer axis on diametric sides of the dynamometer stem;

   two strain gauges bonded to the dynamometer stem perpendicular to the dynamometer axis on diametric sides of the dynamometer stem, so that the parallel strain gauges and the perpendicular strain gauges may be communicatively coupled into a first wheatstone bridge to produce a voltage corresponding to a weight load applied to the dynamometer stem;

   two strain gauges bonded to the dynamometer stem at a forty-five degree angle to an axis perpendicular to the dynamometer axis on diametric sides of the dynamometer stem; and

two strain gauges bonded to the dynamometer stem at a negative forty-five degree angle to the axis perpendicular to the dynamometer axis on diametric sides of they dynamometer stem, so that the strain gauges may be communicatively coupled into a second wheatstone bridge to produce a voltage corresponding to a torque load applied to the dynamometer stem.

3. A system for running a subsea wellhead component from a surface platform, comprising:

a running string adapted to be lowered from the platform to a subsea wellhead;

a running tool having an upper end coupled to a lower end portion of the running string, the running tool adapted to carry and set the component in the subsea wellhead;

the running tool having a rotary device for exerting a setting force in response to rotation;

a dynamometer stem having a bidirectional load cell, the dynamometer stem being coupled inline to the running string and further coupled to the running tool, the dynamometer stem comprising:

a tubular body having a first portion and a second recessed portion, the second recessed portion defining a recess for accepting the load cell; and

a sleeve circumscribing the second recessed portion of the tubular body, and sealingly engaged with the tubular body to protect the load cell from the environment outside the sleeve;

an acoustic signal transmitter coupled to the dynamometer stem and the bidirectional load cell;

the acoustic signal transmitter configured to receive a plurality of load cell signals from the bidirectional load cell and transmit acoustic signals in response through the running string;

an acoustic signal receptor coupled to an upper end portion of the running string and adapted to be above sea level for receiving the acoustical signals transmitted through the running string;

a radio frequency (RF) transmitter mounted to the upper end portion of the running string and electrically connected to the acoustic receiver for transmitting RF signals proportional to the acoustic signals received by the acoustic receiver;

an RF receiver adapted to be located on the platform for receiving the RF signals; and

a display adapted to be located on the platform and configured to present the RF signals received by the RF receiver in a manner understood by an operator on the platform and mounted such that an operator may visually monitor the display in real time.

4. The system of claim 3, wherein the bidirectional load cell comprises at least eight strain gauges arranged into two wheatstone bridges.

5. A method for running a subsea wellhead device from a floating platform, comprising:

(a) providing a running tool weight and torque sensing system coupled inline to a lower end portion of a running string and to a running tool connected to a subsea wellhead device, the weight and torque sensing system having a sensor that senses weight and torque

applied to the running tool and an acoustic transmitter, the weight and torque sensing system including a dynamometer stem that comprises:

a tubular body having a first portion and a second recessed portion, the second recessed portion defining a recess for accepting the sensor; and

a sleeve circumscribing the second recessed portion of the tubular body, and sealingly engaged with the tubular body to protect the sensor from the environment outside the sleeve;

(b) lowering the running string and the sensing system down a subsea riser, coupling an acoustic receiver and radio frequency (RF) receiver inline to an upper end portion of the running string above sea level, and positioning the subsea wellhead device in engagement with a subsea wellhead assembly;

(c) operating the running tool to set the subsea device in the wellhead assembly;

(d) with the sensor, sensing weight and torque imposed on the running tool, and with the acoustic transmitter, transmitting an acoustic signal up the running string proportional to the weight and torque sensed; then

(e) with the acoustic receiver, receiving the acoustic signal, and with the RF transmitter, transmitting an RF signal proportional to the acoustic signal to an RF receiver and a display at a drilling rig on the platform.

6. The method of claim 5, wherein step (c) comprises rotating the running string to rotate a portion of the running tool relative to the wellhead device.

7. The method of claim 5, wherein the sensor comprises a bi-directional load cell, and step (d) comprises:

deforming the dynamometer stem of the sensing system, the deformation changing a resistance of the bidirectional load cell; and

generating the acoustic signal in response to the changed resistance.

8. The method of claim 7, wherein generating the acoustic signal comprises producing a voltage corresponding to a voltage applied to the bidirectional load cell and an applied load at the running tool.

9. The method of claim 5, wherein the method further comprises:

coupling a surface weight and torque sensing system to the upper end portion of the running string above sea level and while performing step (c);

generating a surface signal in a bidirectional load cell of the surface weight and torque sensing system in response to the operating of the running tool in step (c); and

transmitting the surface signal from the bidirectional load cell of the surface weight and torque sensing system to platform.

10. The method of claim 5, wherein step (c) comprises applying at least part of a weight of the running string to the subsea wellhead device.

11. The method of claim 5, wherein step (c) comprises pulling upward on the running string after the subsea wellhead device has been set to test whether the subsea wellhead device is properly set.