a drill bit as it wears out, cleaning and/or treating the drill pipe and/or the wellbore to allow more efficient drilling, running in various tools that perform specific jobs required at certain times in the oil well construction plan, etc. Additionally, tripping operations may require a large number of threaded pipe joints to be disconnected (broken-out) or connected (made-up). Currently, this process involves visual inspection by a human operator to locate a seam (e.g., a break point between pipe segments) and may further include human fine tuning of the position of the seam into an appropriate location so that the tripping operation may be undertaken.

SUMMARY

[0003a] According to a first aspect of the present disclosure, there is provided a system, including: a sensor configured to detect a physical characteristic of a tubular string moving past the sensor and generate a signal indicative of the physical characteristic; and a processing device configured to: process the signal indicative of the physical characteristic to generate a processed signal; determine whether the processed signal is indicative of a deviation of the tubular string by comparison of the processed signal with one or more predetermined values of a thickness of a tubular segment of the tubular string and by determining whether a result of the comparison meets or exceeds a predetermined threshold value; and generate output data utilized to automatically position a tripping apparatus at a location of the deviation on the tubular string, position a roughneck of the tripping apparatus relative to a platform of the tripping apparatus comprising tripping slips, and activate the tripping slips to engage the tubular string in conjunction with operation of the roughneck during a tripping operation when the result of the comparison meets or exceeds the predetermined threshold value.

[0003b] According to a second aspect of the present disclosure, there is provided a device, including: an input configured to receive a signal indicative of motion of a segment; and a processor configured to: process the signal indicative of the motion to generate a processed signal; and generate an output indicative of a position, a speed, or an acceleration of a particular portion of the segment to be used in conjunction with a tripping operation of a tubular string comprising the segment based on the processed signal, wherein the input is configured to receive a second signal indicative of detection of a deviation of the segment, wherein the processor when in operation generates a control signal to control movement of a tripping apparatus and movement of a roughneck of the tripping apparatus relative to a platform of the tripping apparatus comprising tripping slips to position the roughneck to make-up or break-out the segment in conjunction with activation of the tripping slips to engage the segment in conjunction with operation of the roughneck during the tripping operation of the tubular string based upon a result of a comparison between a second processed signal that is based upon the second signal and one or more predetermined values of a thickness of the tubular segment as meeting or exceeding a predetermined threshold value.

[0003c] According to a third aspect of the present disclosure, there is provided an apparatus, including: a platform comprising tripping slips and configured to be moved with respect to a drill floor; a roughneck configured to be coupled to the platform, wherein the roughneck is configured to be moved with respect to the platform and the drill floor, wherein the roughneck is configured to make up or break out a segment of a tubular string; a sensor configured to detect a physical characteristic of a tubular string moving past the sensor and generate a signal indicative of the physical characteristic; and a control system configured to generate output data to control movement of the platform relative to the tubular string and to control movement of the roughneck relative to the platform to position the roughneck at a location of a deviation of the tubular string to facilitate a tripping operation of the tubular string comprising the segment by activating the tripping slips to engage the tubular string in conjunction with operation of the roughneck during the tripping operation, wherein the control system generates the output data when a result of a comparison between one or more predetermined values of a thickness of the tubular segment of the tubular string and a processed signal that is based upon the signal indicative of the physical characteristic.

BRIEF DESCRIPTION OF DRAWINGS

[0004] FIG. 1 illustrates an example of an offshore platform having a riser coupled to a blowout preventer (BOP), in accordance with an embodiment;

[0005] FIG. 2 illustrates a front view a drill rig as illustratively presented in FIG. 1, in accordance with an embodiment;

[0006] FIG. 2A illustrates a front view of the tripping apparatus of FIG. 2, in accordance with an embodiment;

[0007] FIG. 3 illustrates a block diagram of a computing system of FIG. 2, in accordance with an embodiment; and

[0008] FIG. 4 illustrates a flow chart used in conjunction with a tubular string detector, in accordance with an embodiment.

DETAILED DESCRIPTION

[0009] One or more specific embodiments will be described below. In an effort to provide a concise description of these embodiments, all features of an actual implementation may not be described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of

Claims

1. A system, comprising:

a sensor configured to detect a physical characteristic of a tubular string moving past the sensor and generate a signal indicative of the physical characteristic; and

a processing device configured to:

process the signal indicative of the physical characteristic to generate a processed signal;

determine whether the processed signal is indicative of a deviation of the tubular string by comparison of the processed signal with one or more predetermined values of a thickness of a tubular segment of the tubular string and by determining whether a result of the comparison meets or exceeds a predetermined threshold value; and

generate output data utilized to automatically position a tripping apparatus at a location of the deviation on the tubular string, position a roughneck of the tripping apparatus relative to a platform of the tripping apparatus comprising tripping slips, and activate the tripping slips to engage the tubular string in conjunction with operation of the roughneck during a tripping operation when the result of the comparison meets or exceeds the predetermined threshold value.

2. The system of claim 1, wherein the processing device is configured to transmit the output data to control operation of a positioning element to position the tripping apparatus at a distance relative to a drill floor as the location.

3. The system of claim 1, wherein the processing device is configured to transmit the output data to control operation of a positioning element to position the tripping apparatus at the location.

4. The system of claim 1, wherein the processing device is configured to generate the output data based on determining that the processed signal is indicative of the deviation of the tubular string.

5. The system of claim 1, comprising the tripping apparatus, wherein the tripping apparatus comprises the roughneck configured to make-up and break-out a threaded connection between tubular segments of the tubular string.

6 The system of claim 5, wherein the sensor is disposed vertically above the roughneck relative to a drill floor, wherein the sensor is directly coupled to the tripping apparatus.

7. The system of claim 6, wherein the sensor is configured to detect the physical characteristic of the tubular string moving past the sensor and generate the signal indicative of the physical characteristic during the make-up of the threaded connection between the tubular segments of the tubular string.

8 The system of claim 5, comprising a second sensor configured to detect a second physical characteristic of the tubular string moving past the second sensor and generate a second signal indicative of the second physical characteristic.

9. The system of claim 8, wherein the second sensor is disposed vertically below the roughneck relative to a drill floor, wherein the sensor is directly coupled to the tripping apparatus.

10. The system of claim 9, wherein the second sensor is configured to detect the second physical characteristic of the tubular string moving past the second sensor and generate the second signal indicative of the second physical characteristic during the selective break-out of the threaded connection between the tubular segments of the tubular string.

11. The system of claim 1, wherein the sensor comprises a camera, a laser, a transducer, an electrical characteristic sensor, a magnetic characteristic sensor, a chemical sensor, or a metallurgical detection sensor.

12. A device, comprising:

an input configured to receive a signal indicative of motion of a segment; and

a processor configured to:

process the signal indicative of the motion to generate a processed signal; and

generate an output indicative of a position, a speed, or an acceleration of a particular portion of the segment to be used in conjunction with a tripping operation of a tubular string comprising the segment based on the processed signal, wherein the input is configured to receive a second signal indicative of detection of a deviation of the segment, wherein the processor when in operation generates a control signal to control movement of a tripping apparatus and movement of a roughneck of the tripping apparatus relative to a platform of the tripping apparatus comprising tripping slips to position the roughneck to make-up or break-out the segment in conjunction with activation of the tripping slips to engage the segment in conjunction with operation of the roughneck during the tripping operation of the tubular string based upon a result of a comparison between a second processed signal that is based upon the second signal and one or more predetermined values of a thickness of the tubular segment as meeting or exceeding a predetermined threshold value.

13. The device of claim 12, wherein the processor is configured to determine an initial estimate of a location of a deviation of the segment of the tubular string based upon the output.

14. The device of claim 12, wherein the processor is configured to process the second signal to generate the second processed signal used to confirm detection of the location of the deviation.

15. The device of claim 14, wherein the processor is configured to process the second signal by generating a measured feature set based upon the second signal as the second processed signal, compare the measured feature set against the one or more predetermined values, and analyze the results of the comparing to determine if the threshold value is met or exceeded as a confirmation of the detection of the location of the deviation.

16. The device of claim 14, wherein the processor is configured to generate a vector value as the location of the deviation.

17. The device of claim 16, wherein the processor is configured to utilize the vector value to generate the control signal.

18. An apparatus, comprising:

a platform comprising tripping slips and configured to be moved with respect to a drill floor;

a roughneck configured to be coupled to the platform, wherein the roughneck is configured to be moved with respect to the platform and the drill floor, wherein the roughneck is configured to make up or break out a segment of a tubular string;

a sensor configured to detect a physical characteristic of a tubular string moving past the sensor and generate a signal indicative of the physical characteristic; and

a control system configured to generate output data to control movement of the platform relative to the tubular string and to control movement of the roughneck relative to the platform to position the roughneck at a location of a deviation of the tubular string to facilitate a tripping operation of the tubular string comprising the segment by activating the tripping slips to engage the tubular string in conjunction with operation of the roughneck during the tripping operation, wherein the control system generates the output data when a result of a comparison between one or more predetermined values of a thickness of the tubular segment of the tubular string and a processed signal that is based upon the signal indicative of the physical characteristic.

19. The apparatus of claim 18, wherein the control system is configured to generate a second indication to cause the roughneck at the location of the deviation of the tubular string to initiate a make-up or break-out of the segment as part of the tripping operation.