

Claims

1. A system comprising:
 - a pressure sensor that is positionable in a pressurization subsystem for pressurizing a blowout preventer, the pressure sensor for detecting pressure in the pressurization subsystem; and
 - a computing device communicatively coupled to the pressure sensor and including a processing device and a memory device on which instructions are stored for causing the processing device to:
 - receive a plurality of predetermined values associated with pressure changes in the pressurization subsystem over time;
 - receive, from the pressure sensor, a plurality of pressure measurements indicating a plurality of pressures in the pressurization subsystem over a time period;
 - generate, based on the plurality of predetermined values and the plurality of pressure measurements, a model representing a relationship between pressure in the pressurization subsystem and time; and
 - predict, using the model, pressures in the pressurization subsystem over a future period of time that is subsequent to the time period.
2. The system of claim 1, wherein the memory device further includes instructions for causing the processing device to:
 - determine, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, a rate of decay of the pressure in the pressurization subsystem during the future period of time; and
 - determine that the rate of decay is within a range of acceptable decay rates.
3. The system of claim 2, wherein the range of acceptable decay rates is between three pounds per square inch (psi) per minute and five psi per minute.
4. The system of claim 3, wherein the memory device further includes instructions for causing the processing device to:
 - determine, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, that the rate of decay will be within the

range of acceptable decay rates for an acceptable period of time that is at least five minutes long.

5. The system of claim 1, wherein the memory device further includes instructions for causing the processing device to:

determine, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, a pressure level at which the pressure in the pressurization subsystem is substantially stable; and

determine that the pressure level is within an acceptable range of pressures.

6. The system of claim 5, wherein the acceptable range of pressures is between 1,000 psi and 20,000 psi.

7. The system of claim 1, wherein the model is based on a thermal-cooling characteristic of the pressurization subsystem.

8. A non-transitory computer-readable medium in which instructions executable by a processing device are stored for causing the processing device to:

receive a plurality of predetermined values associated with pressure changes in a pressurization subsystem over time, the pressurization subsystem being for pressurizing a blowout preventer in a well system;

receive, from a pressure sensor, a plurality of pressure measurements indicating a plurality of pressures in the pressurization subsystem over a time period;

generate, based on the plurality of predetermined values and the plurality of pressure measurements, a model representing a relationship between pressure in the pressurization subsystem and time; and

predict, using the model, pressures in the pressurization subsystem over a future period of time that is subsequent to the time period.

9. The non-transitory computer-readable medium of claim 8, further comprising instructions for causing the processing device to determine, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, that a rate of decay of the pressure in the pressurization subsystem will remain within a range of acceptable decay rates for an acceptable period of time.

10. The non-transitory computer-readable medium of claim 9, wherein the range of acceptable decay rates is between three psi per minute and 5 psi per minute, and the acceptable period of time is at least five minutes.

11. The non-transitory computer-readable medium of claim 8, further comprising instructions for causing the processing device to, prior to the time period, cause a pump of the pressurization subsystem to communicate an oil-based mud or a synthetic-based mud through the pressurization subsystem to pressurize the pressurization subsystem.

12. The non-transitory computer-readable medium of claim 8, further comprising instructions for causing the processing device to:

determine, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, a pressure level at which the pressure in the pressurization subsystem is substantially stable; and

determine that the pressure level is within an acceptable range of pressures.

13. The non-transitory computer-readable medium of claim 12, wherein the acceptable range of pressures is between 1,000 psi and 20,000 psi.

14. The non-transitory computer-readable medium of claim 8, wherein the model is based on a thermal-cooling characteristic of the blowout preventer.

15. A method comprising:

receiving, by a computing device, a plurality of predetermined values associated with pressure changes in a pressurization subsystem over time, the pressurization subsystem being for pressurizing a blowout preventer in a well system;

receiving, by the computing device and from a pressure sensor, a plurality of pressure measurements indicating a plurality of pressures in the pressurization subsystem over a time period;

generating, by the computing device and based on the plurality of predetermined values and the plurality of pressure measurements, a model

representing a relationship between pressure in the pressurization subsystem and time; and

predicting, by the computing device and using the model, pressures in the pressurization subsystem over a future period of time that is subsequent to the time period.

16. The method of claim 15, further comprising determining, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, that a rate of decay of the pressure in the pressurization subsystem is less than an acceptable decay rate for an acceptable period of time.

17. The method of claim 16, wherein the acceptable decay rate is less than five psi per minute, and the acceptable period of time is at least five minutes.

18. The method of claim 15, further comprising causing, prior to the time period, a pump of the pressurization subsystem to pump an oil-based mud or a synthetic-based mud through the pressurization subsystem to pressurize the pressurization subsystem.

19. The method of claim 15, further comprising:
determining, by analyzing the predicted pressures in the pressurization subsystem over the future period of time, a pressure level at which the pressure in the pressurization subsystem is substantially stable; and
determining that the pressure level is within an acceptable range of pressures.

20. The method of claim 19, wherein the acceptable range of pressures is between 1,000 psi and 20,000 psi, and wherein the model is based on a thermal-cooling characteristic of the blowout preventer.