Claims:

What is claimed is:

1. A system for pigging between a first body rotatively coupled to a second body, comprising:

an inline swivel comprising a fixed part and a rotating part, wherein the fixed part of the inline swivel is configured to be connected to the second body and the rotating part of the inline swivel is configured to be connected to the first body;

a toroidal swivel comprising a fixed part and a rotating part, wherein the fixed part of the toroidal swivel is configured to be connected to the second body and the rotating part of the toroidal swivel is configured to be connected to the first body;

a first fluid conduit configured to be in fluid communication with a fluid supply conduit disposed on the first body and the rotating part of the inline swivel, wherein the first fluid conduit comprises a first launch valve located between the fluid supply conduit and the rotating part of the inline swivel;

a second fluid conduit in fluid communication with the first fluid conduit and the rotating part of the toroidal swivel, wherein the second fluid conduit is in fluid communication with the first fluid conduit at a location located between the fluid supply conduit and the first launch valve, and wherein the second fluid conduit comprises a second launch valve located between the first fluid conduit and the rotating part of the toroidal swivel;

a third fluid conduit in fluid communication with the first fluid conduit and configured to be in fluid communication with a first fluid return conduit disposed on the first body, wherein the third fluid conduit is in fluid communication with the first fluid conduit at a location located between the first launch valve and the rotating part of the inline swivel, and wherein the third fluid conduit comprises a first return valve located between the first fluid conduit and the first fluid return conduit;

a fourth fluid conduit in fluid communication with the rotating part of the toroidal swivel and the third fluid conduit, wherein the fourth fluid conduit is in fluid communication with the third fluid conduit at a location located between the first fluid

return conduit and the first return valve, and wherein the fourth fluid conduit comprises a second return valve located between the rotating part of the toroidal swivel and the first fluid return conduit;

a fifth fluid conduit in fluid communication with the fixed part of the inline swivel and configured to be in fluid communication with a fluid discharge conduit disposed on the second body, wherein the fifth fluid conduit comprises a third launch valve located between the fixed part of the inline swivel and the fluid discharge conduit;

a sixth fluid conduit in fluid communication with the fixed part of the toroidal swivel and the fifth fluid conduit, wherein the sixth fluid conduit is in fluid communication with the fifth fluid conduit at a location located between the fluid discharge conduit and the third launch valve, and wherein the sixth fluid conduit comprises a fourth launch valve located between the fixed part of the toroidal swivel and the fluid discharge conduit;

a seventh fluid conduit in fluid communication with the fifth fluid conduit and configured to be in fluid communication with a second fluid return conduit disposed on the second body, wherein the seventh fluid conduit is in fluid communication with the fifth fluid conduit at a location located between the third launch valve and the fixed part of the inline swivel, and wherein the seventh fluid conduit comprises a third return valve located between the fifth fluid conduit and the second fluid return conduit; and

an eighth fluid conduit in fluid communication with the fixed part of the toroidal swivel and the seventh fluid conduit, wherein the eighth fluid conduit is in fluid communication with the seventh fluid conduit at a location located between the second fluid return conduit and the third return valve, and wherein the eighth fluid conduit comprises a fourth return valve located between the fixed part of the toroidal swivel and the second fluid return conduit.

2. The system of claim 1, wherein:

the fixed part of the inline swivel and the rotating part of the inline swivel are configured to maintain fluid communication between the first fluid conduit and the fifth fluid conduit as the first body rotates relative to the second body, and

the fixed part of the toroidal swivel and the rotating part of the toroidal swivel are configured to maintain fluid communication between the second fluid conduit, the fourth fluid conduit, the sixth fluid conduit and the eighth fluid conduit as the first body rotates relative to the second body.

3. The system of claim 2, wherein the rotating part of the inline swivel and the rotating part of the toroidal swivel are each configured to rotate about a longitudinal axis that is colinear with a longitudinal axis of the inline swivel, and a longitudinal axis of the toroidal swivel.

4. The system of claim 1, wherein the first body is a rotating part of a turret mooring system and the second body is a fixed part of the turret mooring system configured to be substantially rotationally fixed about a vertical axis relative to the earth.

5. The system of claim 1, wherein the first body is a vessel configured to float on a surface of a body of water and the second body is a fixed part of a turret mooring system configured to be substantially rotationally fixed about a vertical axis relative to the earth.

6. The system of claim 1, further comprising a control system, wherein the control system is configured to independently open and close the first launch valve, the second launch valve, the third launch valve, the fourth launch valve, the first return valve, the second return valve, the third return valve, and the fourth return valve.

7. The system of claim 1, further comprising a pig launcher configured to be disposed on the first body and configured to be in fluid communication with the first fluid conduit, and a pig receiver configured to be disposed on the first body and configured to be in fluid communication with the third fluid conduit.

8. The system of claim 1, wherein the third conduit is in fluid communication with the first conduit via a first piggable wye and the seventh fluid conduit is in fluid communication with the fifth fluid conduit via a second piggable wye.

9. The system of claim 8, wherein the first piggable wye and the second piggable wye each comprise a switch configured to direct a pig therethrough.

10. The system of claim 7, further comprising a pig detector disposed on the fluid supply conduit, the first fluid conduit, the fifth fluid conduit, or the fluid discharge conduit and a control system, wherein the control system is configured to independently open and close the first launch valve, the second launch valve, the third launch valve, the fourth launch valve, the first return valve, the second return valve, the third return valve, and the fourth return valve and to receive a signal from the pig detector indicating that a pig has passed the pig detector.

11. The system of claim 10, wherein the pig detector is disposed on the fifth fluid conduit or on the fluid discharge conduit.

12. The system of claim 11, wherein the control system is configured to place the system into a launch mode or into a receive mode.

13. The system of claim 12, wherein the control system is configured to switch the system from the launch mode to the receive mode after the pig detector has detected that a pig has passed the pig detector.

14. The system of claim 12, wherein:

the system is in the launch mode when the first launch valve is open, the second launch valve is closed, the third launch valve is open, the fourth launch valve is closed, the first return valve is closed, the second return valve is open, the third return valve is closed and the fourth return valve is open, and the system is in the receive mode when the

first launch valve is closed, the second launch valve is open, the third launch valve is closed, the fourth launch valve is open, the first return valve is open, the second return valve is closed, the third return valve is open, and the fourth return valve is closed, or

the system is in the launch mode when the first launch valve is open, the second launch valve is closed, the third launch valve is closed, the fourth launch valve is open, the first return valve is closed, the second return valve is open, the third return valve is open and the fourth return valve is closed, and the system is in the receive mode when the first launch valve is closed, the second launch valve is open, the third launch valve is open, the fourth launch valve is closed, the first return valve is open, the second return valve is closed, the third return valve is closed, and the fourth return valve is open.

15. The system of claim 1, wherein the first launch valve, the third launch valve, the first return valve, and the third return valve are each independently a through conduit ball valve or a through conduit gate valve.

16. The system of claim 1, further comprising a structure disposed within at least one of the second fluid conduit, the fourth fluid conduit, the sixth fluid conduit, and the eighth fluid conduit, wherein the structure is configured to prevent a pig from entering the second fluid conduit, the fourth fluid conduit, the sixth fluid conduit, and/or the eighth fluid conduit when the pig passes through the first fluid conduit, the third fluid conduit, the fifth fluid conduit, and/or the seventh fluid conduit, respectively.

17. A process for pigging between a first body rotatively coupled to a second body of a system, comprising:

inserting a pig into a first fluid conduit, wherein the system comprises:

an inline swivel comprising a fixed part and a rotating part, wherein the fixed part of the inline swivel is configured to be connected to the second body and the rotating part of the inline swivel is configured to be connected to the first body;

a toroidal swivel comprising a fixed part and a rotating part, wherein the fixed part of the toroidal swivel is configured to be connected to the second body and the rotating part of the toroidal swivel is configured to be connected to the first body;

a first fluid conduit configured to be in fluid communication with a fluid supply conduit disposed on the first body and the rotating part of the inline swivel, wherein the first fluid conduit comprises a first launch valve located between the fluid supply conduit and the rotating part of the inline swivel;

a second fluid conduit in fluid communication with the first fluid conduit and the rotating part of the toroidal swivel, wherein the second fluid conduit is in fluid communication with the first fluid conduit at a location located between the fluid supply conduit and the first launch valve, and wherein the second fluid conduit comprises a second launch valve located between the first fluid conduit and the rotating part of the toroidal swivel;

a third fluid conduit in fluid communication with the first fluid conduit and configured to be in fluid communication with a first fluid return conduit disposed on the first body, wherein the third fluid conduit is in fluid communication with the first fluid conduit at a location located between the first launch valve and the rotating part of the inline swivel, and wherein the third fluid conduit comprises a first return valve located between the first fluid conduit and the first fluid return conduit;

a fourth fluid conduit in fluid communication with the rotating part of the toroidal swivel and the third fluid conduit, wherein the fourth fluid conduit is in fluid communication with the third fluid conduit at a location located between the first fluid return conduit and the first return valve, and wherein the fourth fluid conduit comprises a second return valve located between the rotating part of the toroidal swivel and the first fluid return conduit;

a fifth fluid conduit in fluid communication with the fixed part of the inline swivel and configured to be in fluid communication with a fluid discharge conduit disposed on the second body, wherein the fifth fluid conduit comprises a third launch valve located between the fixed part of the inline swivel and the fluid discharge conduit;

a sixth fluid conduit in fluid communication with the fixed part of the toroidal swivel and the fifth fluid conduit, wherein the sixth fluid conduit is in fluid communication with the fifth fluid conduit at a location located between the fluid discharge conduit and the third launch valve, and wherein the sixth fluid conduit comprises a fourth launch valve located between the fixed part of the toroidal swivel and the fluid discharge conduit;

a seventh fluid conduit in fluid communication with the fifth fluid conduit and configured to be in fluid communication with a second fluid return conduit disposed on the second body, wherein the seventh fluid conduit is in fluid communication with the fifth fluid conduit at a location located between the third launch valve and the fixed part of the inline swivel, and wherein the seventh fluid conduit comprises a third return valve located between the fifth fluid conduit and the second fluid return conduit; and

an eighth fluid conduit in fluid communication with the fixed part of the toroidal swivel and the seventh fluid conduit, wherein the eighth fluid conduit is in fluid communication with the seventh fluid conduit at a location located between the second fluid return conduit and the third return valve, and wherein the eighth fluid conduit comprises a fourth return valve located between the fixed part of the toroidal swivel and the second fluid return conduit;

placing the system into a launch mode;

flowing a fluid from the fluid supply line to displace the pig from the first fluid conduit toward the inline swivel;

flowing the fluid until the pig has passed the third launch valve;

placing the system into a receive mode; and

flowing the fluid until the pig has entered the third fluid conduit.

18. The process of claim 17, wherein:

placing the system into the launch mode comprises configuring the system such that the first launch valve is open, the second launch valve is closed, the third launch valve is open, the fourth launch valve is closed, the first return valve is closed, the second return valve is open, the third return valve is closed and the fourth return valve is open,

and wherein placing the system into the receive mode comprises configuring the system such that the first launch valve is closed, the second launch valve is open, the third launch valve is closed, the fourth launch valve is open, the first return valve is open, the second return valve is closed, the third return valve is open, and the fourth return valve is closed, or

placing the system into the launch mode comprises configuring the system such that the first launch valve is open, the second launch valve is closed, the third launch valve is closed, the fourth launch valve is open, the first return valve is closed, the second return valve is open, the third return valve is open and the fourth return valve is closed, and wherein placing the system into the receive mode comprises configuring the system such that the first launch valve is closed, the second launch valve is open, the third launch valve is open, the fourth launch valve is closed, the first return valve is open, the second return valve is closed, the third return valve is closed, and the fourth return valve is open.

19. The process of claim 17, wherein the system further comprises at least one of:

a pig launcher in fluid communication with the fluid supply conduit, wherein inserting the pig into the first fluid conduit comprises loading the pig into the pig launcher, and

a pig receiver in fluid communication with the third fluid conduit, the process further comprising receiving the pig with the pig receiver.

20. The process of claim 17, wherein the system further comprises a pig detector and a control system, wherein the pig detector is disposed on the fifth fluid conduit or the fluid discharge conduit, and wherein placing the system in the receive mode is performed by the control system after the pig detector detects the pig has passed the pig detector.