

CLAIMS

1. A system for producing well production fluids through a tubing hanger connected with a tubing string, comprising:
 - a subsea tree comprising a structure comprising:
 - a production flow passage; and
 - a production valve to control production fluid flow through the production flow passage;
 - a tubing spool comprising:
 - a body comprising a longitudinal bore configured to receive a and support the tubing hanger alone, and a lateral production flow passage extending from the longitudinal bore and configured to transfer product production fluids to the subsea tree production flow passage;
 - wherein the subsea tree comprises a plurality of valves each coupled to a structure positioned radially outward from the tubing spool longitudinal bore structure and is separate and located spatially apart from the tubing spool body such that the subsea tree does not block a subsea intervention connection or blowout preventer (BOP) access to the longitudinal bore, at least one of the valves including a production valve to control production flow and does not experience bending moments created in the tubing spool.
2. The system of claim 1, wherein the subsea tree and the tubing spool are independently retrievable.
3. The system of claim 1, comprising the tubing hanger, wherein the tubing hanger is configured to support a tubing string and to direct the product from the tubing string into the lateral flow passage, and wherein the subsea tree and the tubing hanger are independently retrievable.

4. The system of claim 1, wherein the subsea tree does not include a wellhead connection.
5. The system of claim 1, wherein the structure of the subsea tree is positioned at one circumferential region radially outward from the tubing spool longitudinal bore.
6. The system of claim 5, wherein the tubing spool comprises a hub connection extending laterally outward past the tubing spool body and comprising a hub configured to receive the product from the lateral production flow passage, and the subsea tree comprises a mating interface with a corresponding hub connection comprising a hub on the subsea tree configured to interface with the hub connection to transfer product between the lateral production flow passage and the subsea tree.
7. The system of claim 6, wherein the hub connection is configured to interface with the mating hub connection along a plane substantially perpendicular to an axis of the longitudinal bore.
8. The system of claim 6, wherein the hub connection is configured to interface with the mating hub connection along a plane substantially parallel to an axis of the longitudinal bore.
9. The system of claim 6, wherein the hub connection and the mating hub connection each comprise respective conduits configured to transfer liquid to an annulus, a subsurface safety valve, a chemical injection conduit, or a combination thereof.
10. The system of claim 1, wherein the structure of the subsea tree is circumferentially disposed about the tubing spool.

11. A system comprising:
 - a tubing spool for use with a tubing hanger and a subsea tree comprising a hub connection, comprising:
 - a body comprising a longitudinal bore configured to receive and support the tubing hanger alone;
 - a hub connection extending laterally outward from past the tubing spool, a longitudinal bore and comprising a hub, and
 - a lateral production flow passage extending between from the longitudinal bore and through the hub connection, and
 - wherein the hub connection is configured to interface with the hub of the subsea tree mating hub connection to communicate production flow fluids to the subsea tree through the lateral production flow passage of a subsea tree.
12. The system of claim 11, comprising a tubing hanger disposed within the longitudinal bore, wherein the tubing hanger is configured to support a tubing string and to direct a flow of product production fluid from the tubing string into the lateral flow passage.
13. The system of claim 12, comprising the subsea tree having the mating hub connection, wherein the subsea tree is separate and positioned radially outward from the tubing spool body such that the subsea tree and the tubing hanger are independently retrievable.
14. The system of claim 13, wherein the subsea tree and the tubing spool are independently retrievable.
15. A system for producing well production fluids comprising:
 - a subsea tree comprising a structure comprising :
 - a production flow passage;
 - a production valve to control production fluid flow through the production flow passage;

a mating hub connection comprising a hub and configured to receive a production flow fluids;

a tubing spool comprising

a body comprising a first end configured to interface with a wellhead, a second end configured to interface with a blowout preventer (BOP),

a first longitudinal bore extending between the first end and the second end,

a hub connection comprising a hub extending laterally outward past the tubing spool body and configured to output the flow of product to the subsea tree, and

a first lateral flow passage extending between the first longitudinal bore and the hub connection, wherein the hub connection is configured to interface with the mating hub connection; and

a tubing hanger disposed and alone supported within the tubing spool first longitudinal bore, wherein the tubing hanger comprises a second longitudinal bore and a second lateral flow passage in fluid communication with the second longitudinal bore, and wherein the second lateral flow passage is in fluid communication with the first lateral flow passage to establish a flow path between the second longitudinal bore and the hub connection;

wherein the subsea tree structure is separate and located spatially apart from the tubing spool body such that the subsea tree does not experience bending moments created in the tubing spool; and

wherein the tubing hanger and the subsea tree are configured to be run and retrieved independently of one another.

16. The system of claim 15, comprising a tree cap disposed within the first longitudinal bore between the tubing hanger and the second end, wherein the tree cap is configured to block the flow of product out of the tubing spool.

17. The system of claim 15, comprising a plug disposed within the second longitudinal bore downstream from the second lateral flow passage, wherein the plug is configured to block the flow of product out of the tubing hanger.
18. The system of claim 15, wherein the subsea tree is positioned radially outward from the tubing spool first longitudinal bore.
19. The system of claim 15, wherein the hub connection is configured to interface with the mating hub connection along a plane substantially perpendicular or substantially parallel to an axis of the first longitudinal bore.
20. The system of claim 15, comprising a plug disposed within the second longitudinal bore upstream of the second lateral flow passage, wherein the plug is configured to block production flow to the hub connection.

CLAIMS

1. A system for producing well production fluids through a tubing hanger connected with a tubing string, comprising:

 a subsea tree comprising a structure comprising:

 a production flow passage; and

 a production valve to control production fluid flow through the production flow passage;

 a tubing spool comprising:

 a body comprising a longitudinal bore configured to receive and support the tubing hanger; and

 a lateral production flow passage extending from the longitudinal bore and configured to transfer production fluids to the subsea tree production flow passage;

 wherein the subsea tree structure is separate and located spatially apart from the tubing spool body such that the subsea tree does not block a subsea intervention or blowout preventer (BOP) connection to the tubing spool longitudinal bore.

2. The system of claim 1, wherein the subsea tree and the tubing spool are independently retrievable.

3. The system of claim 1, comprising the tubing hanger, wherein the tubing hanger is configured to support a tubing string and to direct the product from the tubing string into the lateral production flow passage, and wherein the subsea tree and the tubing hanger are independently retrievable.

4. The system of claim 1, wherein the subsea tree does not include a wellhead connection.

5. The system of claim 1, wherein the structure of the subsea tree is positioned at one circumferential region radially outward from the tubing spool longitudinal bore.
6. The system of claim 5, wherein the tubing spool comprises a hub connection extending laterally outward past the tubing spool body and comprising a hub configured to interface with a corresponding hub connection comprising a hub on the subsea tree to transfer product between the lateral production flow passage and the subsea tree.
7. The system of claim 6, wherein the hub connection is configured to interface with the mating hub connection along a plane substantially perpendicular to an axis of the longitudinal bore.
8. The system of claim 6, wherein the hub connection is configured to interface with the mating hub connection along a plane substantially parallel to an axis of the longitudinal bore.
9. The system of claim 6, wherein the hub connection and the mating hub connection each comprise respective conduits configured to transfer liquid to an annulus, a subsurface safety valve, a chemical injection conduit, or a combination thereof.
10. The system of claim 1, wherein the structure of the subsea tree is circumferentially disposed about the tubing spool.
11. A system comprising a tubing spool for use with a tubing hanger and a subsea tree comprising a hub connection, comprising:
 - a body comprising a longitudinal bore configured to receive and support the tubing hanger;

a hub connection extending laterally outward past the longitudinal bore and comprising a hub;

a lateral production flow passage extending from the longitudinal bore and through the hub connection; and

wherein the hub connection is configured to interface with the hub of the subsea tree hub connection to communicate production fluids to the subsea tree through the lateral production flow passage.

12. The system of claim 11, wherein the tubing hanger is configured to direct a flow of production fluid from the tubing string into the lateral production flow passage.

13. The system of claim 12, wherein the subsea tree is separate and positioned radially outward from the tubing spool body such that the subsea tree and the tubing hanger are independently retrievable.

14. The system of claim 13, wherein the subsea tree and the tubing spool are independently retrievable.

15. A system for producing well production fluids, comprising:

a subsea tree comprising a structure comprising:

a production flow passage;

a production valve to control production fluid flow through the production flow passage;

a mating hub connection comprising a hub and configured to receive production fluids;

a tubing spool comprising:

a body comprising an end configured to interface with a blowout preventer (BOP);

a first longitudinal bore;

a hub connection comprising a hub extending laterally outward past the tubing spool body and configured to output the production flow to the subsea tree; and

a first lateral production flow passage extending between the longitudinal bore and the hub connection, wherein the hub connection is configured to interface with the mating hub connection;

a tubing hanger disposed and supported within the tubing spool longitudinal bore, wherein the tubing hanger comprises a second longitudinal bore and a second lateral production flow passage in fluid communication with the second longitudinal bore, and wherein the second lateral production flow passage is in fluid communication with the first lateral production flow passage to establish a production flow path between the second longitudinal bore and the hub connection;

wherein the subsea tree structure is separate and located spatially apart from the tubing spool body; and

wherein the tubing hanger and the subsea tree are configured to be run and retrieved independently of one another.

16. The system of claim 15, comprising a tree cap disposed within the first longitudinal bore between the tubing hanger and the end, wherein the tree cap is configured to block the production flow out of the tubing spool.

17. The system of claim 15, comprising a plug disposed within the second longitudinal bore downstream from the second lateral flow passage, wherein the plug is configured to block the production flow out of the tubing hanger.

18. The system of claim 15, wherein the subsea tree is positioned radially outward from the tubing spool first longitudinal bore.

19. The system of claim 15, wherein the hub connection is configured to interface with the mating hub connection along a plane substantially perpendicular or substantially parallel to an axis of the first longitudinal bore.

20. The system of claim 15, comprising a plug disposed within the second longitudinal bore upstream of the second lateral production flow passage, wherein the plug is configured to block production flow to the hub connection.

21. The system of claim 15, wherein the subsea tree and the tubing spool are retrievable independently from one another.

22. The system of claim 1, wherein the subsea tree does not comprise a longitudinal bore sized for receiving the tubing hanger.