and/or fluid acceleration during the injection process, reducing the efficacy of the polymer and potentially requiring more polymer to produce a desired result.

BRIEF DESCRIPTION OF THE DISCLOSURE

[0005] Certain embodiments commensurate in scope with the originally claimed embodiments are summarized below. These embodiments are not intended to limit the scope of the claimed embodiments, but rather these embodiments are intended only to provide a brief summary of possible forms of the disclosure. Indeed, the present disclosure may encompass a variety of forms that may be similar to or different from the embodiments set forth below.

[0005a] An aspect of the invention provides a system comprising, a subsea chemical injection system configured to inject a chemical into a well, wherein the subsea chemical injection system comprises, a subsea choke configured to flow the chemical, and a choke trim of the subsea choke, wherein the choke trim comprises a first plurality of spiral flow paths, wherein each of the first plurality of spiral flow paths comprises a decreasing cross-sectional area from a respective flow path inlet of each of the first plurality of spiral flow paths to a respective flow path outlet of each of the first plurality of spiral flow paths. The choke trim comprises a first cylinder comprising the first plurality of spiral flow paths, a second cylinder comprising a second plurality of spiral flow paths, wherein the first cylinder is disposed within the second cylinder, and an outer portion, wherein the second cylinder is disposed within the outer portion, and each of the second plurality of spiral flow paths abuts a second inner bore of the outer portion.

[0005b] Another aspect of the invention provides a method comprising, directing a flow of a polymer solution through an inlet of a choke body, directing the flow of the polymer solution through a first plurality of spiral flow paths of a choke trim disposed within the choke body, directing the flow of the polymer solution through a second plurality of spiral flow paths of the choke trim, wherein each of the second plurality of flow paths extends about the first plurality of spiral flow paths, collecting the polymer solution in a cavity of the choke trim disposed

at an axial end of the choke trim opposite the inlet of the choke body after directing the flow of the polymer solution through the first and second pluralities of spiral flow paths, and directing the flow of the polymer solution through a plurality of axial passages extending from the axial end of the choke trim to an annular region disposed between the choke trim and the choke body, wherein the annular region is exposed to an outlet of the choke body, wherein each of the first and second pluralities of spiral flow paths comprises a gradually decreasing cross-sectional area from a respective flow path inlet of each of the first and second pluralities of spiral flow paths to a respective flow path outlet of each of the first and second pluralities of spiral flow paths.

[0005c] Yet another aspect of the invention provides a system comprising, a choke trim of a subsea choke configured to flow a chemical for injection into a subsea well, wherein the choke trim comprises a first cylinder comprising a first plurality of spiral flow paths, a second cylinder comprising a second plurality of spiral flow paths, wherein the first cylinder is disposed within the second cylinder, and an outer portion comprising a plurality of axial passages, wherein the second cylinder is disposed within the outer portion.

[0006] There is disclosed a system including a subsea chemical injection system configured to inject a chemical into a well, wherein the subsea chemical injection system includes a subsea choke configured to flow the chemical and a choke trim of the subsea choke, wherein the choke trim comprises a flow path having a cross-sectional area and a length, and the cross-sectional area and length are each adjustable independent from one another.

[0007] There is disclosed a system including a choke trim of a subsea choke configured to flow a chemical for injection into a subsea well, wherein the choke trim comprises a flow path having a cross-sectional area and a length, wherein the cross-sectional area and length are each adjustable independent from one another.

[0008] There is disclosed a method including adjusting a first position of a first component of a choke trim relative to a second component of the choke trim to adjust a cross-sectional area of a flow path of the choke trim and adjusting a second position of a third component of the choke trim relative to a fourth component of the choke trim to adjust a length of the flow path of the choke trim, wherein the cross-sectional area and length are each adjustable independent from one another.

[0009] There is disclosed a system including a subsea chemical injection system configured to inject a chemical into a well, wherein the subsea chemical

injection system includes a subsea choke configured to flow the chemical and a choke trim of the subsea choke, wherein the choke trim comprises a flow path having a length, the length is adjustable, and the flow path comprises a gradually decreasing cross-sectional area along at least a portion of the length.

[0010] There is disclosed a system including a choke trim of a subsea choke configured to flow a chemical for injection into a subsea well, wherein the choke trim includes a flow path having a length, and the length is adjustable.

[0011] There is disclosed a method including adjusting a position of a first component of a choke trim relative to a second component of the choke trim to adjust a length of a flow path of the choke trim.

[0012] There is disclosed a system including a subsea chemical injection system configured to inject a chemical into a well, wherein the subsea chemical injection system comprises a subsea choke configured to flow the chemical and a choke trim of the subsea choke. The choke trim comprises a first plurality of spiral flow paths, wherein each of the first plurality of spiral flow paths comprises a decreasing cross-sectional area from a respective inlet to a respective outlet of each of the first plurality of spiral flow paths.

[0013] There is disclosed a method including directing a flow of a polymer solution through an inlet of a choke body, directing the flow of the polymer solution through a first plurality of spiral flow paths of a choke trim, and directing the flow of the polymer solution through a second plurality of spiral flow paths of the choke trim, wherein the second plurality of flow paths extend about the first plurality of spiral flow paths, wherein each of the first and second pluralities of spiral flow paths comprises a gradually decreasing cross-sectional area along a respective length of each of the first and second pluralities of spiral flow paths.

[0014] There is disclosed a system including a choke trim of a subsea choke configured to flow a chemical for injection into a subsea well, wherein the choke trim comprises a first cylinder comprising a first plurality of spiral flow paths, a second cylinder comprising a second plurality of spiral flow paths,

wherein the first cylinder is disposed within the second cylinder, and an outer portion comprising a plurality of axial passages, wherein the second cylinder is disposed within the outer portion.

[0015] There is disclosed a system including a subsea chemical injection system configured to inject a chemical into a well, wherein the subsea chemical injection system includes a subsea choke configured to flow the chemical and a choke trim of the subsea choke, wherein the choke trim comprises a porous material.

[0016] There is disclosed a method including directing a flow of a polymer solution through an inlet of a choke body, directing the flow of the polymer solution through a porous element of a choke trim disposed within the choke body, wherein the porous element comprises a sintered material, and directing the flow of the polymer solution through an outlet of the choke body.

[0017] There is disclosed a system including a choke trim of a subsea choke configured to flow a chemical for injection into a subsea well, wherein the choke trim comprises a porous material, and the porous material is formed from a sintering process.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Various features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying figures in which like characters represent like parts throughout the figures, wherein:

[0019] FIG. 1 is a schematic of an embodiment of a polymer injection system, in accordance with aspects of the present disclosure;

[0020] FIG. 2 is a cross-sectional side view of an embodiment of a low shear choke trim disposed within a choke of a polymer injection system, in accordance with aspects of the present disclosure;

CLAIMS

1. A system, comprising:

a subsea chemical injection system configured to inject a chemical into a well, wherein the subsea chemical injection system comprises:

a subsea choke configured to flow the chemical; and

a choke trim of the subsea choke, wherein the choke trim comprises a first plurality of spiral flow paths, wherein each of the first plurality of spiral flow paths comprises a decreasing cross-sectional area from a respective flow path inlet of each of the first plurality of spiral flow paths to a respective flow path outlet of each of the first plurality of spiral flow paths, and wherein the choke trim comprises:

a first cylinder comprising the first plurality of spiral flow paths;

a second cylinder comprising a second plurality of spiral flow paths, wherein the first cylinder is disposed within the second cylinder; and

an outer portion, wherein the second cylinder is disposed within the outer portion, and each of the second plurality of spiral flow paths abuts a second inner bore of the outer portion.

2. The system of claim 1, wherein each of the first plurality of spiral flow paths abuts a first inner bore of the second cylinder.

3. The system of claim 1, wherein the outer portion is secured within the subsea choke.

4. The system of claim 1, wherein each of the first and second pluralities of spiral flow paths is exposed to an inlet of the subsea choke.

5. The system of claim 4, wherein the outer portion comprises a plurality of axial flow passages exposed to the respective flow path outlet of each of the first and second pluralities of spiral flow paths, wherein the respective flow path outlets are at an axial end of the choke trim opposite the inlet of the subsea choke.

6. The system of claim 5, wherein each of the plurality of axial flow passages extends from the axial end of the choke trim to an annular region between the choke trim and the subsea choke.

7. The system of claim 6, wherein the annular region is exposed to an outlet of the subsea choke.

8. The system of claim 1, wherein each of the second plurality of spiral flow paths comprises a decreasing cross-sectional area from a respective flow path inlet of each of the second plurality of spiral flow paths to a respective flow path outlet of each of the second plurality of spiral flow paths.

9. The system of claim 1, comprising a multiple orifice valve, wherein the multiple orifice valve is configured to selectively block flow to each of the first plurality of spiral flow paths.

10. A method, comprising:

directing a flow of a polymer solution through an inlet of a choke body;

directing the flow of the polymer solution through a first plurality of spiral flow paths of a choke trim disposed within the choke body;

directing the flow of the polymer solution through a second plurality of spiral flow paths of the choke trim, wherein each of the second plurality of flow paths extends about the first plurality of spiral flow paths;

collecting the polymer solution in a cavity of the choke trim disposed at an axial end of the choke trim opposite the inlet of the choke body after directing the flow of the polymer solution through the first and second pluralities of spiral flow paths; and

directing the flow of the polymer solution through a plurality of axial passages extending from the axial end of the choke trim to an annular region disposed between the choke trim and the choke body, wherein the annular region is exposed to an outlet of the choke body,

wherein each of the first and second pluralities of spiral flow paths comprises a gradually decreasing cross-sectional area from a respective flow

path inlet of each of the first and second pluralities of spiral flow paths to a respective flow path outlet of each of the first and second pluralities of spiral flow paths.

11. The method of claim 10, comprising selectively blocking the flow of the polymer solution to each of the first and second pluralities of flow paths with a multiple orifice valve.

12. A system, comprising:

a choke trim of a subsea choke configured to flow a chemical for injection into a subsea well, wherein the choke trim comprises:

a first cylinder comprising a first plurality of spiral flow paths;

a second cylinder comprising a second plurality of spiral flow paths, wherein the first cylinder is disposed within the second cylinder; and

an outer portion comprising a plurality of axial passages, wherein the second cylinder is disposed within the outer portion.

13. The system of claim 12, wherein each of the first and second pluralities of spiral flow paths comprises a tapered cross-sectional area along a respective length of each of the first and second pluralities of spiral flow paths.

14. The system of claim 12, wherein the choke trim comprises a cavity disposed between the first and second pluralities of spiral flow paths and the plurality of axial passages.

15. The system of claim 12, wherein each of first and second pluralities of spiral flow paths comprises an entry point exposed to an inlet of the subsea choke, and each of the plurality of axial passages comprises an exit point exposed to an outlet of the subsea choke.

16. The system of claim 12, comprising an actuator configured to selectively block flow of the chemical into each of the first and second pluralities of spiral flow paths.