of choke trims exist for use in various applications and operating conditions of the fluid-handling system. Unfortunately, different styles of choke trims usually require different choke bodies.

SUMMARY

[0004A] According to a first aspect, there is provided a choke valve system, comprising: a choke valve body having a choke trim seat recess disposed about an axis inside the choke valve body; and a plurality of choke trims, comprising: a plug and cage choke trim having a plug disposed inside at least one cage having a first radial opening and a first axial opening; an external sleeve choke trim having an external sleeve disposed about an inner cage having a second radial opening and a second axial opening; and a drilling choke trim having a third radial opening and a third axial opening, wherein the third radial opening of the drilling choke trim is sized larger than the first and second radial openings to enable the drilling choke trim to pass larger particles than the plug and cage choke trim and the external sleeve choke trim, wherein each of the plurality of choke trims is configured to be mutually exclusively secured within the choke valve body axially against the choke trim seat recess, and each of the plurality of choke trims has the same outer diameter.

[0004B] According to a second aspect, there is provided a method, comprising: securing a drilling choke trim within a production choke valve body, wherein the drilling choke trim is disposed axially against a choke trim seat recess disposed about an axis inside the production choke valve body, and the drilling choke trim comprises a first radial opening and a first axial opening; completing a first downhole well formation process; removing the drilling choke trim from the production choke valve body; securing a production choke trim within the production choke valve body, wherein the production choke trim is disposed axially against the choke trim seat recess, the production choke trim comprises a second radial opening and a second axial opening, and the first radial opening of the drilling choke trim is sized larger than the second radial opening of the production choke trim; and completing a second downhole well formation process.

DESCRIPTION OF THE DRAWINGS

[0005] These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0006] FIG. 1 is a schematic of a fluid-handling system including a choke valve, illustrating a plurality of choke trims that may be used with a single choke body, in accordance with an embodiment of the present disclosure;

[0007] FIG. 2 is a cross-sectional side view of a choke valve, illustrating a choke trim disposed within a choke body of the choke valve, in accordance with an embodiment of the present disclosure;

[0008] FIG. 3 is a cross-sectional side view of an embodiment of a choke trim (e.g., a plug and cage type choke trim) which may be disposed with the choke body, in accordance with an embodiment of the present disclosure;

[0009] FIG. 4 is a cross-sectional side view of an embodiment of a choke trim (e.g., a floating or external sleeve type choke trim) which may be disposed with the choke body, in accordance with an embodiment of the present disclosure; and

[0010] FIG. 5 is a cross-sectional side view of an embodiment of a choke trim (e.g., a drilling, clean-up, or anti-blockage type choke trim) which may be disposed with the choke body, in accordance with an embodiment of the present disclosure.

CLAIMS

1. A choke valve system, comprising:

a choke valve body having a choke trim seat recess disposed about an axis inside the choke valve body; and

a plurality of choke trims, comprising:

a plug and cage choke trim having a plug disposed inside at least one cage having a first radial opening and a first axial opening;

an external sleeve choke trim having an external sleeve disposed about an inner cage having a second radial opening and a second axial opening; and

a drilling choke trim having a third radial opening and a third axial opening, wherein the third radial opening of the drilling choke trim is sized larger than the first and second radial openings to enable the drilling choke trim to pass larger particles than the plug and cage choke trim and the external sleeve choke trim,

wherein each of the plurality of choke trims is configured to be mutually exclusively secured within the choke valve body axially against the choke trim seat recess, and each of the plurality of choke trims has the same outer diameter.

2. The choke valve system of claim 1, wherein an axial end of at least one trim of the plurality of choke trims stays open across the axis while installed in the choke valve body.

3. The choke valve system of claim 1, comprising a bonnet, wherein each of the plurality of choke trims is configured to be retained between the choke trim seat recess and the bonnet.

4. The choke valve system of claim 3, wherein at least one of the plurality of choke trims is configured to be retained between the choke trim seat recess and the bonnet with at least one additional retaining feature.

5. The choke valve system of claim 4, wherein the additional retaining feature comprises one or more retaining elements positioned between the bonnet and the at least one of the plurality of choke trims.

6. The choke valve system of claim 1, wherein the at least one cage of the plug and cage choke trim has a plurality of first radial openings, the inner cage of the external sleeve choke trim has a plurality of second radial openings, and the third radial opening of the drilling choke trim is sized larger than the plurality of first radial openings and the plurality of second radial openings.

7. The choke valve system of claim 1, wherein each of the plurality of choke trims has approximately the same overall length.

8. The choke valve system of claim 1, wherein the choke valve body comprises a production choke body designed for only a production choke trim.

9. The choke valve system of claim 1, comprising an actuator configured to adjust a position of each of the plurality of choke trims.

10. The choke valve system of claim 1, wherein at least one trim of the plurality of choke trims is configured to be secured within the choke valve body with an axial end of the at least one trim disposed axially against the choke trim seat recess.

11. The choke valve system of claim 1, wherein at least one trim of the plurality of choke trims is configured to be secured within the choke valve body with a first portion of the at least one trim disposed axially against the choke trim seat recess and a second portion of the at least one trim extending axially into a central bore of the choke valve body beyond the choke trim seat recess.

12. The choke valve system of claim 3, wherein at least part of each trim of the plurality of choke trims is configured to be directly retained by the bonnet, the bonnet is configured to be fastened to a side wall of the choke valve body, and the bonnet is configured to couple with the choke valve body after one of the plurality of choke trims is installed within the choke valve body.

13. The choke valve system of claim 9, comprising a controller configured to regulate operation of the actuator based on a type of choke trim positioned within the choke valve body.

14. A method, comprising:

securing a drilling choke trim within a production choke valve body, wherein the drilling choke trim is disposed axially against a choke trim seat recess disposed about an axis inside the production choke valve body, and the drilling choke trim comprises a first radial opening and a first axial opening;

completing a first downhole well formation process;

removing the drilling choke trim from the production choke valve body;

securing a production choke trim within the production choke valve body, wherein the production choke trim is disposed axially against the choke trim seat recess, the production choke trim comprises a second radial opening and a second axial opening, and the first radial opening of the drilling choke trim is sized larger than the second radial opening of the production choke trim; and

completing a second downhole well formation process.

15. The method of claim 14, wherein the first downhole well formation process comprises a well drilling process, a well clean-up process, or both.

16. The method of claim 14, wherein the second downhole well formation process comprises a mineral production process.

17. The method of claim 14, wherein the production choke trim comprises a plug and cage choke trim or an external sleeve choke trim.

18. The method of claim 14, comprising:

removing the production choke trim from the production choke valve body;

securing a different choke trim within the production choke valve body; and

completing a third downhole well formation process.

19. The method of claim 18, wherein the third downhole well formation process comprises a well clean-up process, a well fracking process, or both.