Claims

What is claimed is:

1. A distributed inflow control device configured for being disposed in a wellbore through a fluid-producing formation, the distributed inflow control device comprising:

a shroud adapted to circumferentially cover a section of a tubing string and to be disposed in the fluid-producing formation, wherein the shroud comprises a profile including a plurality of flow paths that are adapted to be between the fluid-producing formation and an inner volume of the section of the tubing string, wherein each flow path of the plurality of flow paths is configured to restrict a fluid flow through the flow path and is independent of each other flow path, and

a seal over the profile including the plurality of flow paths, the seal causing fluid to flow from a respective inlet to a respective outlet of each flow path and preventing fluid from entering or exiting each flow path at a point other than the respective inlet or the respective outlet.

2. The distributed inflow control device of claim 1, wherein the seal comprises an additional shroud configured for circumferentially covering the shroud.

3. The distributed inflow control device of claim 1, wherein the plurality of flow paths comprises a plurality of curvilinear flow paths.

4. The distributed inflow control device of claim 1, wherein each flow path comprises a variable diode configured to restrict the fluid flow.

5. The distributed inflow control device of claim 1, wherein the plurality of flow paths comprises a plurality of straight flow paths, each straight flow path of the plurality of straight flow paths having a respective dimension configured to generate a fluid friction restricting the fluid flow.

6. The distributed inflow control device of claim 1, wherein the distributed inflow control device is configured to be coupled to a filtering element circumferentially surrounding the distributed inflow control device.

7. The distributed inflow control device of claim 1, wherein the distributed inflow control device is configured to be coupled to a filtering element in line with the distributed inflow control device.

8. The distributed inflow control device of claim 1, wherein the shroud is configured to be formed by processing a rigid material to form the profile including the plurality of flow paths.

9. The distributed inflow control device of claim 1, wherein the plurality of flow paths comprises a parallel fluidic circuit.

10. The distributed inflow control device of claim 1, further comprising:

a plurality of flexible tubes adapted to circumferentially surround the section of the tubing string and to be disposed in the fluid-producing formation and further adapted to define an additional plurality of flow paths that are adapted to be between the fluid-producing formation and the inner volume of the section of the tubing string, wherein each flexible tube is adapted to provide a respective flow path independent from each other flow path and is configured to restrict the fluid flow through the flow path; and

at least one fastening device configured to couple the plurality of flexible tubes to the section of the tubing string.

11. The distributed inflow control device of claim 10, wherein the plurality of flexible tubes comprises a plurality of coiled control lines.

12. A flow control assembly configured for being disposed in a wellbore through a fluid-producing formation, the flow control assembly comprising:

a distributed inflow control device adapted to circumferentially cover a section of a tubing string and to be disposed in the fluid-producing formation, the distributed inflow control device including a plurality of flow paths that are adapted to be between the fluid-producing formation and an inner volume of the section of the tubing string, wherein each flow path of the plurality of flow paths is configured to restrict a fluid flow through the flow path and is independent of each other flow path; and

a filtering element configured for circumferentially surrounding the distributed inflow control device.

13. The flow control assembly of claim 12, wherein the distributed inflow control device comprises:

a shroud adapted to circumferentially cover the section of the tubing string and to be disposed in the fluid-producing formation, wherein the shroud comprises a profile including the plurality of flow paths, and

a seal over the profile including the plurality of flow paths, the seal causing fluid to flow from a respective inlet to a respective outlet of each flow path and preventing fluid from entering or exiting the flow path at a point other than the respective inlet or the respective outlet.

14. The flow control assembly of claim 13, wherein the seal of the distributed inflow control device comprises an additional shroud configured for circumferentially covering the shroud.

15. The flow control assembly of claim 13, wherein the plurality of flow paths comprises a plurality of curvilinear flow paths.

16. The flow control assembly of claim 13, wherein each flow path comprises a variable diode configured to restrict the fluid flow.

17. The flow control assembly of claim 13, wherein the shroud is configured to be formed by processing a rigid material to form the profile including the plurality of flow paths.

18. The flow control assembly of claim 12, wherein the distributed inflow control device comprises plurality of flexible tubes adapted to define the plurality of flow paths, and

at least one fastening device configured to couple the plurality of flexible tubes to the section of the tubing string.

19. The flow control assembly of claim 18, wherein the plurality of flexible tubes comprises a plurality of control lines.

20. A method of manufacturing a distributed inflow control device capable of being disposed in a bore, the method comprising:

processing a first rigid material to form a profile including a plurality of flow paths;

positioning a second rigid material over the profile; and

coupling the second rigid material to the first rigid material, wherein coupling the second rigid material to the first rigid material forms a seal over the profile including the plurality of flow paths.

21. The method of claim 20, wherein processing the first rigid material comprises:

machining the profile into the first rigid material; or

deforming the first rigid material, wherein deforming the first rigid material includes imprinting the profile by into the first rigid material by a press machine.

22. The method of claim 20, wherein each of the plurality of flow paths comprises a respective curvilinear flow path configured to restrict a fluid flow through the respective curvilinear flow path.

23. The method of claim 20, wherein each flow path comprises a variable diode configured to restrict a fluid flow through the flow path.

CLAIMS

What is claimed is:

1. A distributed inflow control device configured for being disposed in a wellbore through a fluid-producing formation, the distributed inflow control device comprising:

a shroud adapted to circumferentially cover a section of a tubing string and to be disposed in the fluid-producing formation, wherein the shroud comprises a profile including a plurality of flow paths that are adapted to be between the fluid-producing formation and an inner volume of the section of the tubing string, wherein each flow path of the plurality of flow paths is configured to restrict a fluid flow through the flow path and is independent of each other flow path, and

a seal over the profile including the plurality of flow paths, the seal causing fluid to flow from a respective inlet to a respective outlet of each flow path and preventing fluid from entering or exiting each flow path at a point other than the respective inlet or the respective outlet;

wherein the respective inlets of the plurality of flow paths are parallel with each other and the corresponding respective outlets are also parallel with each other which allow fluid flow through the plurality of flow paths to be in parallel with and independent from one another.

2. The distributed inflow control device of claim 1, wherein the seal comprises an additional shroud configured for circumferentially covering the shroud.

3. The distributed inflow control device of claim 1, wherein the plurality of flow paths comprises a plurality of curvilinear flow paths.

4. The distributed inflow control device of claim 1, wherein each flow path comprises a variable diode configured to restrict the fluid flow.

5. The distributed inflow control device of claim 1, wherein the plurality of flow paths comprises a plurality of straight flow paths, each straight flow path of the plurality of straight flow paths having a respective dimension configured to generate a fluid friction restricting the fluid flow.

6. The distributed inflow control device of claim 1, wherein the distributed inflow control device is configured to be coupled to a filtering element circumferentially surrounding the distributed inflow control device.

7. The distributed inflow control device of claim 1, wherein the distributed inflow control device is configured to be coupled to a filtering element in line with the distributed inflow control device.

8. The distributed inflow control device of claim 1, wherein the shroud is configured to be formed by processing a rigid material to form the profile including the plurality of flow paths.

9. The distributed inflow control device of claim 1, wherein the plurality of flow paths comprises a parallel fluidic circuit.

10. The distributed inflow control device of claim 1, further comprising:

a plurality of flexible tubes adapted to circumferentially surround the section of the tubing string and to be disposed in the fluid-producing formation and further adapted to define an additional plurality of flow paths that are adapted to be between the fluid-producing formation and the inner volume of the section of the tubing string, wherein each flexible tube is adapted to provide a respective flow path independent from each other flow path and is configured to restrict the fluid flow through the flow path; and

at least one fastening device configured to couple the plurality of flexible tubes to the section of the tubing string.

11. The distributed inflow control device of claim 10, wherein the plurality of flexible tubes comprises a plurality of coiled control lines.

12. A flow control assembly configured for being disposed in a wellbore through a fluid-producing formation, the flow control assembly comprising:

a distributed inflow control device adapted to circumferentially cover a section of a tubing string and to be disposed in the fluid-producing formation, the distributed inflow control device including a plurality of flow paths that are adapted to be between

the fluid-producing formation and an inner volume of the section of the tubing string, wherein each flow path of the plurality of flow paths is configured to restrict a fluid flow through the flow path and is independent of each other flow path;

a filtering element configured for circumferentially surrounding the distributed inflow control device;

wherein the plurality of flow paths include respective inlets that are parallel with each other and respective outlets that are also parallel with each other, which allow fluid flow through the plurality of flow paths to be in parallel with and independent from one another.

13. The flow control assembly of claim 12, wherein the distributed inflow control device comprises:

a shroud adapted to circumferentially cover the section of the tubing string and to be disposed in the fluid-producing formation, wherein the shroud comprises a profile including the plurality of flow paths, and

a seal over the profile including the plurality of flow paths, the seal causing fluid to flow from a respective inlet to a respective outlet of each flow path and preventing fluid from entering or exiting the flow path at a point other than the respective inlet or the respective outlet.

14. The flow control assembly of claim 13, wherein the seal of the distributed inflow control device comprises an additional shroud configured for circumferentially covering the shroud.

15. The flow control assembly of claim 13, wherein the plurality of flow paths comprises a plurality of curvilinear flow paths.

16. The flow control assembly of claim 13, wherein each flow path comprises a variable diode configured to restrict the fluid flow.

17. The flow control assembly of claim 13, wherein the shroud is configured to be formed by processing a rigid material to form the profile including the plurality of flow paths.

18. The flow control assembly of claim 12, wherein the distributed inflow control device comprises plurality of flexible tubes adapted to define the plurality of flow paths, and

at least one fastening device configured to couple the plurality of flexible tubes to the section of the tubing string.

19. The flow control assembly of claim 18, wherein the plurality of flexible tubes comprises a plurality of control lines.

20. A method of manufacturing a distributed inflow control device capable of being disposed in a bore, the method comprising:

processing a first rigid material to form a profile including a plurality of flow paths;

positioning a second rigid material over the profile; and

coupling the second rigid material to the first rigid material, wherein coupling the second rigid material to the first rigid material forms a seal over the profile including the plurality of flow paths;

wherein the plurality of flow paths include respective inlets that are parallel with each other and respective outlets that are also parallel with each other which allow fluid flow through the plurality of flow paths to be in parallel with and independent from one another.

21. The method of claim 20, wherein processing the first rigid material comprises:

machining the profile into the first rigid material; or

deforming the first rigid material, wherein deforming the first rigid material includes imprinting the profile by into the first rigid material by a press machine.

22. The method of claim 20, wherein each of the plurality of flow paths comprises a respective curvilinear flow path configured to restrict a fluid flow through the respective curvilinear flow path.

23. The method of claim 20, wherein each flow path comprises a variable diode configured to restrict a fluid flow through the flow path.