CLAIMS

What is claimed is:

1. A multi-bore junction assembly, comprising:

a connector body having an upper end and a lower end, the lower end providing a main bore leg receptacle and a lateral bore leg receptacle;

a main bore leg coupled to the main bore leg receptacle and extending longitudinally therefrom;

a lateral bore leg coupled to the lateral bore leg receptacle and extending longitudinally therefrom, wherein the main and lateral bore legs are round, tubular structures; and

a first mechanical stiffener arranged on the main bore leg and a second mechanical stiffener arranged on the lateral bore leg, wherein the first and second mechanical stiffeners each exhibit a generally D- shaped cross-section, wherein the first and second mechanical stiffeners are arranged back-to-back.

2. The multi-bore junction assembly of claim 1, wherein one or both of the main and lateral bore legs are threadably coupled to the main and lateral bore leg receptacles, respectively.

3. The multi-bore junction assembly of claim 1, wherein the first and second mechanical stiffeners each provide a first end, a second end, and a transition section defined at each of the first and second ends, wherein each transition section transitions the cross-sectional shape of the first and second mechanical stiffeners from round to D-shaped or D-shaped to round.

4. The multi-bore junction assembly of claim 1, wherein a combined outside diameter of the main and lateral bore legs and the first and second mechanical stiffeners is less than an outside diameter of the connector body.

5. The multi-bore junction assembly of claim 1, wherein one or both of the first and second mechanical stiffeners forms an integral part of the main and lateral bore legs, respectively.

6. The multi-bore junction assembly of claim 1, wherein one or both of the first and second mechanical stiffeners is secured to an outer surface of the main and lateral bore legs, respectively.

7. The multi-bore junction assembly of claim 1, wherein one or both of the first and second mechanical stiffeners defines an interior and the main and lateral bore legs are received and secured within the interior of the first and second mechanical stiffeners, respectively.

8. The multi-bore junction assembly of claim 1, wherein one or both of the first and second mechanical stiffeners includes at least one wing secured to the main or lateral bore legs, respectively.

9. The multi-bore junction assembly of claim 8, wherein the at least one wing is secured to the main or lateral bore legs via at least one of welding, brazing, an industrial adhesive, shrink-fitting, one or more mechanical fasteners, or any combination thereof.

10. The multi-bore junction assembly of claim 8, wherein the at least one wing is secured to the main or lateral bore legs via a dovetail joint.

11. The multi-bore junction assembly of claim 1, wherein the first and second mechanical stiffeners comprise a first set of mechanical stiffeners and the multi-bore junction assembly further comprises a second set of mechanical stiffeners axially offset from the first set of mechanical stiffeners.

12. A well system, comprising:

a main wellbore and a lateral wellbore extending from the main wellbore at a junction;

a deflector arranged in the main wellbore at or near the junction;

a multi-bore junction assembly extendable within the main wellbore and including a connector body, a main bore leg coupled to the connector body at a main bore leg receptacle, and a lateral bore leg coupled to the connector body at a lateral bore leg receptacle, wherein the main and lateral bore legs are round, tubular structures; and

a first mechanical stiffener arranged on the main bore leg and a second mechanical stiffener arranged on the lateral bore leg, wherein the first and second mechanical stiffeners each exhibit a generally D- shaped cross-section, wherein the first and second mechanical stiffeners are arranged back-to-back.

13. The well system of claim 12, wherein the lateral bore leg extends into the lateral bore and the main bore leg is stabbed into the deflector.

14. The well system of claim 12, wherein one or both of the main and lateral bore legs are threadably coupled to the main and lateral bore leg receptacles, respectively.

15. The well system of claim 12, wherein one or both of the first and second mechanical stiffeners forms an integral part of the main and lateral bore legs, respectively.

16. The well system of claim 12, wherein one or both of the first and second mechanical stiffeners defines an interior, and the main and lateral bore legs are received and secured within the interior.

17. The well system of claim 12, wherein one or both of the first and second mechanical stiffeners includes at least one wing secured to the main or lateral bore legs via at least one of welding, brazing, an industrial adhesive, shrink-fitting, one or more mechanical fasteners, or any combination thereof.

18. A method, comprising:

lowering a multi-bore junction assembly into a main wellbore having a deflector arranged therein at or near a junction between the main bore and a lateral wellbore, the multi-bore junction assembly including a connector body, a main bore leg coupled to the connector body at a main bore leg receptacle, and a lateral bore leg coupled to the connector body at a lateral bore leg receptacle, wherein the main and lateral bore legs are round, tubular structures;

rotating the multi-bore junction assembly within the main wellbore to align the main bore leg with the deflector and to align the lateral bore leg with the lateral wellbore; and

stabilizing the main and lateral bore legs with a first mechanical stiffener arranged on the main bore leg and a second mechanical stiffener arranged on the lateral bore leg, wherein the first and second mechanical stiffeners each exhibit a generally D-shaped cross- section, wherein the first and second mechanical stiffeners are arranged back-to-back.

19. The method of claim 18, wherein stabilizing the main and lateral bore legs comprises reducing axial loading on the main and lateral bore legs with the first and second mechanical stiffeners, respectively.

20. The method of claim 18, wherein stabilizing the main and lateral bore legs comprises resisting torsional loading on the main and lateral bore legs with the first and second mechanical stiffeners, respectively.

21. The method of claim 20, further comprising preventing the main and lateral bore legs from twisting about one another with the first and second mechanical stiffeners.

22. The method of claim 20, wherein one or both of the main and lateral bore legs are threadably coupled to the main and lateral bore leg receptacles, respectively, the method further comprising preventing the main and lateral bore legs from unthreading from the main and lateral bore leg receptacles, respectively, with the first and second mechanical stiffeners.

23. The method of claim 18, wherein the first and second mechanical stiffeners comprise a first set of mechanical stiffeners and the multi-bore junction assembly further comprises a second set of mechanical stiffeners axially offset from the first set of mechanical stiffeners, the method further comprising increasing a resistance against axial loading on the main and lateral bore legs with the second set of mechanical stiffeners.