CLAIMS

What is claimed is:

1. A metal-to-metal (MS) seal for a wellhead, comprising:

two sides;

an area between the two sides to receive an energizing element; and

one or more slits on at least one of the two sides to change a stiffness of the MS seal and to enable at least one movable portion for the at least one of the two sides, the one or more slits to allow fluid from a lower area relative to the MS seal to cause the at least one movable portion to extend towards a wall of the wellhead and to form a first seal with at least one portion of the wellhead.

2. The MS seal of claim 1, wherein the energizing element is adapted to cause the at least one movable portion to form a second seal with the at least one portion of the wellhead.

3. The MS seal of claim 1, wherein the one or more slits are disposed vertically with respect to an alignment of the MS seal in the wellhead or disposed in an angle with respect to the alignment of the MS seal in the wellhead.

4. The MS seal of claim 1, wherein a first one of the two sides is adapted to be against a side of the wellhead and a second one of the two sides is adapted to be against a hanger of the wellhead.

5. The MS seal of claim 4, wherein the one or more slits are located at a lower portion of the at least one of the two sides.

6. The MS seal of claim 4, wherein a first one of the two sides is comprised of an upper portion and a lower portion, and wherein the first one of the two sides has a higher overall height than a second one of the two sides.

7. The MS seal of claim 1, wherein the two sides comprise bumps, wickers, or grooves therein to engage with the wellhead or a hanger.

8. The MS seal of claim 1, wherein a material of the MS seal is comprised an alloy seal, stainless steel, or nickel alloy, the material adapted for high pressure and high temperature metal-to-metal sealing.

9. The MS seal of claim 1, wherein the one or more slits further comprise at least one channel extending around a circumference of the MS seal.

10. A method of manufacturing a metal-to-metal (MS) seal, comprising:

forming a circumferential metal ring having an area between two sides of the circumferential metal ring, the area to receive an energizing element; and

machining one or more slits on at least one of the two sides to change a stiffness of the MS seal and to enable at least one movable portion for the at least one of the two sides, the one or more slits to allow fluid from a lower area relative to the MS seal to cause the at least one movable portion to extend towards a wall of the wellhead and to form a first seal with at least one portion of the wellhead.

11. The method of claim 10, wherein the energizing element is adapted to cause the at least one movable portion to form a second seal prior to the first seal.

12. The method of claim 10, wherein the machining of the one or more slits enables a vertical disposition of the one or more slits with respect to an alignment of the MS seal in the wellhead or enables an angled disposition for the one or more slits with respect to the alignment of the MS seal in the wellhead.

13. The method of claim 10, wherein the machining is one or more of: a lathe turning operation, a face grooving operation, an electrical discharge machining (EDM), a three-dimensional (3D) printing, a material forming operation, and a rolling operation.

14. The method of claim 10, further comprising:

positioning a spacer between the one or more slits to achieve a predetermined amount of movement for the movable portions representing a change in the stiffness of the MS seal; and

drilling a channel to connect the one or more slits, the channel to comprise the fluid to enable the predetermined amount of movement for the movable portions.

15. The method of claim 10, further comprising:

drilling at least one channel around a circumference to connect the one or more slits, the at least one channel to allow the fluid to fill around the circumference to enable the MS seal to form a third seal with the wellhead.

16. A method of sealing a wellhead, comprising:

positioning, in a first position in the wellhead and between the wellhead and a hanger, a circumferential metal ring having an area between two sides, the area to receive an energizing element, the circumferential metal ring to comprise at least one slit on at least one of the two sides, the slit to change a stiffness of the circumferential metal ring;

energizing the circumferential metal ring using the energizing element to achieve a second position, in the wellhead, for the circumferential metal ring, the energizing to cause at least one movable portion enabled by the slit to form a first seal between the wellhead and the hanger; and

allowing fluid from a lower area of the wellhead to cause the at least one movable portion to extend towards a wall of the wellhead, the at least one movable portion to form a second seal between the wellhead and the hanger.

17. The method of claim 16, further comprising:

enabling the fluid to reach a predetermined pressure to achieve the second seal.

18. The method of claim 16, wherein the energizing element is an e-ring having a taper shape to energize the circumferential metal ring.

19. The method of claim 16, wherein the circumferential metal ring is a U-cup having the two sides and having the area disposed in a U-shape in between the two sides.

20. The method of claim 16, wherein the at least one of the two sides is textured by forming bumps, wickers, or grooves on the at least one of two sides.