CLAIMS

What is claimed is:

1. A method for manufacturing a multi-lobed helical rotor comprising:

mixing one or more powdered metals;

compacting a mixture of the one or more powdered metals to form a solid metal piece;

sintering the solid metal piece; and

polishing the solid metal piece.

2. The method of claim 1, further comprising choosing the one or more powdered metals as the base material for the multi-lobed helical rotor.

3. The method of claim 1, further comprising choosing the one or more powdered metals and at least one additive as the base material for the multi-lobed helical rotor.

4. The method of claim 1, wherein the step of mixing comprises combining the one or more powdered metals with at least one additive.

5. The method of claim 1, wherein the step of compacting comprises adding the at least one powdered metal and at least one additive to a die and compacting the at least one powdered metal and at least one additive with a hydraulic ram.

6. The method of claim 5, wherein the step of compacting the at least one powdered metal and the at least one additive with a hydraulic ram forms the multi-lobed helical rotor.

7. The method of claim 6, wherein the step of sintering comprises placing the multi-lobed helical rotor in a furnace wherein the furnace is a multi-belt furnace.

8. The method of claim 1, wherein the step of polishing is performed by an abrasive flow machine.

9. The method of claim 1, wherein the step of compacting and the step of sintering are combined into a single step in which the compacting is performed at elevated temperatures.

10. A system comprising:

a positive displacement pump comprising:

a casing;

a multi-lobed helical rotor disposed in the casing, wherein the multi-lobed helical rotor comprises sintered powdered metals;

an inlet to the casing; and

an outlet leading from the casing.

11. The system of claim 10, wherein the sintered powdered metals were formed from powdered metals having a particle size of from about 0.5 microns to about 100 microns.

12. The system of claim 10, wherein the multi-lobed helical rotor comprises 17-4 stainless steel.

13. The system of claim 10, wherein the multi-lobed helical rotor further comprises at least one additive selected from the group consisting of plastic, carbon, copper, wax, and combinations thereof.

14. The system of claim 10, wherein the system further comprises a second multi-lobed helical rotor disposed in the casing, wherein the second multi-lobed helical rotor comprises sintered powdered metal.

15. The system of claim 10, wherein the system further comprises feed conduit coupled to the positive displacement pump, a drill string coupled to the feed conduit, a derrick comprising a traveling block for raising and lowering the drill string wherein the drill string is at least partially disposed in a wellbore, and wherein the positive displacement pump is connected to a solids control system and wherein the solids control system is connected to a retention pit.